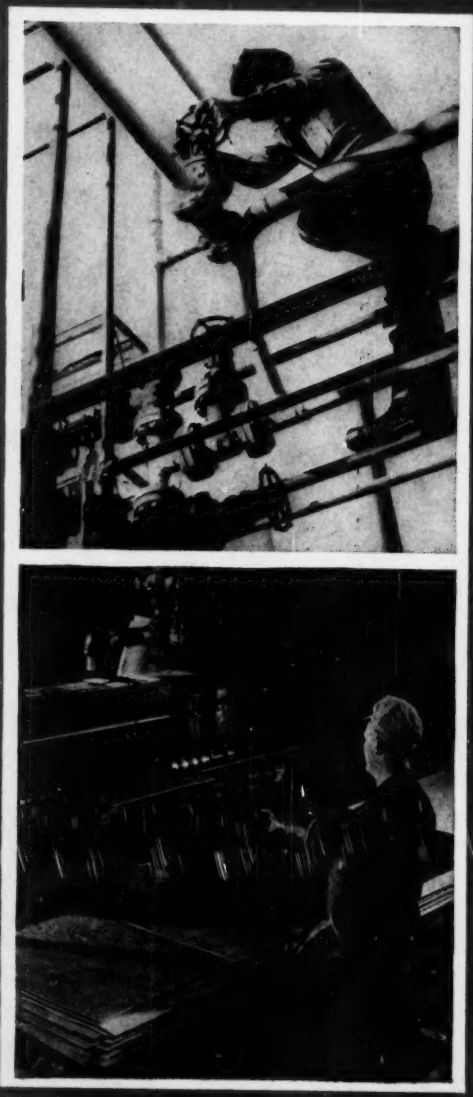
Chemical Week

January 17, 1953



C. I. I.—bone of antitrust contention; here's who, what, where, how big it is . . . . . p. 18

Silicones by the ton; CW Camera sizes up new $5-million plant expansion . . . . . p. 40

How a centralized intelligence service spots new uses, sparks new sales . . . . . p. 48

Phenol demand gets another shot in the arm as shell molding beefs up resin outlook . . . . . p. 51

New adhesives, more adhesives; that's the ticket as plywood plants boom . . . . . p. 63

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between the pitch and the pan...

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Chemical Week

Volume 72 • January 17, 1953 • Number 3

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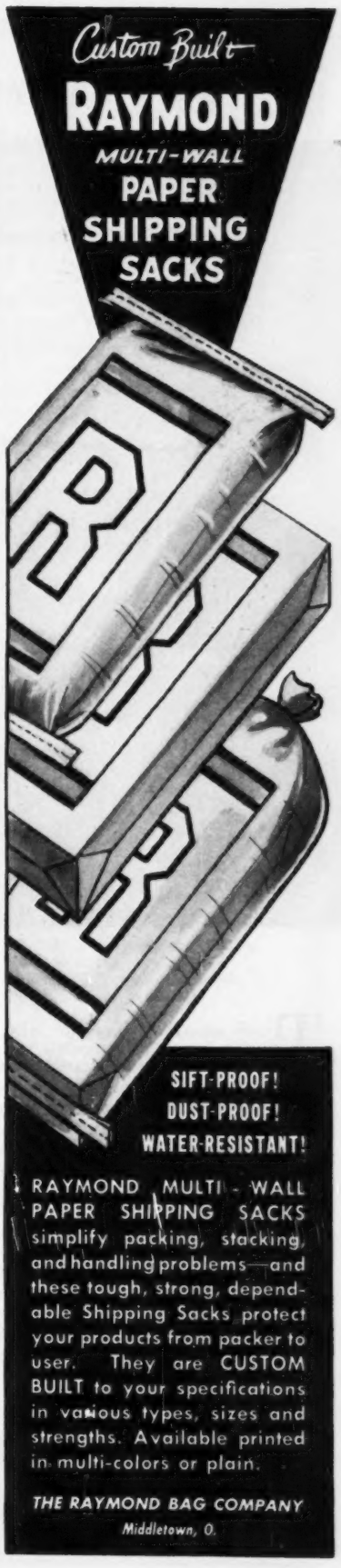
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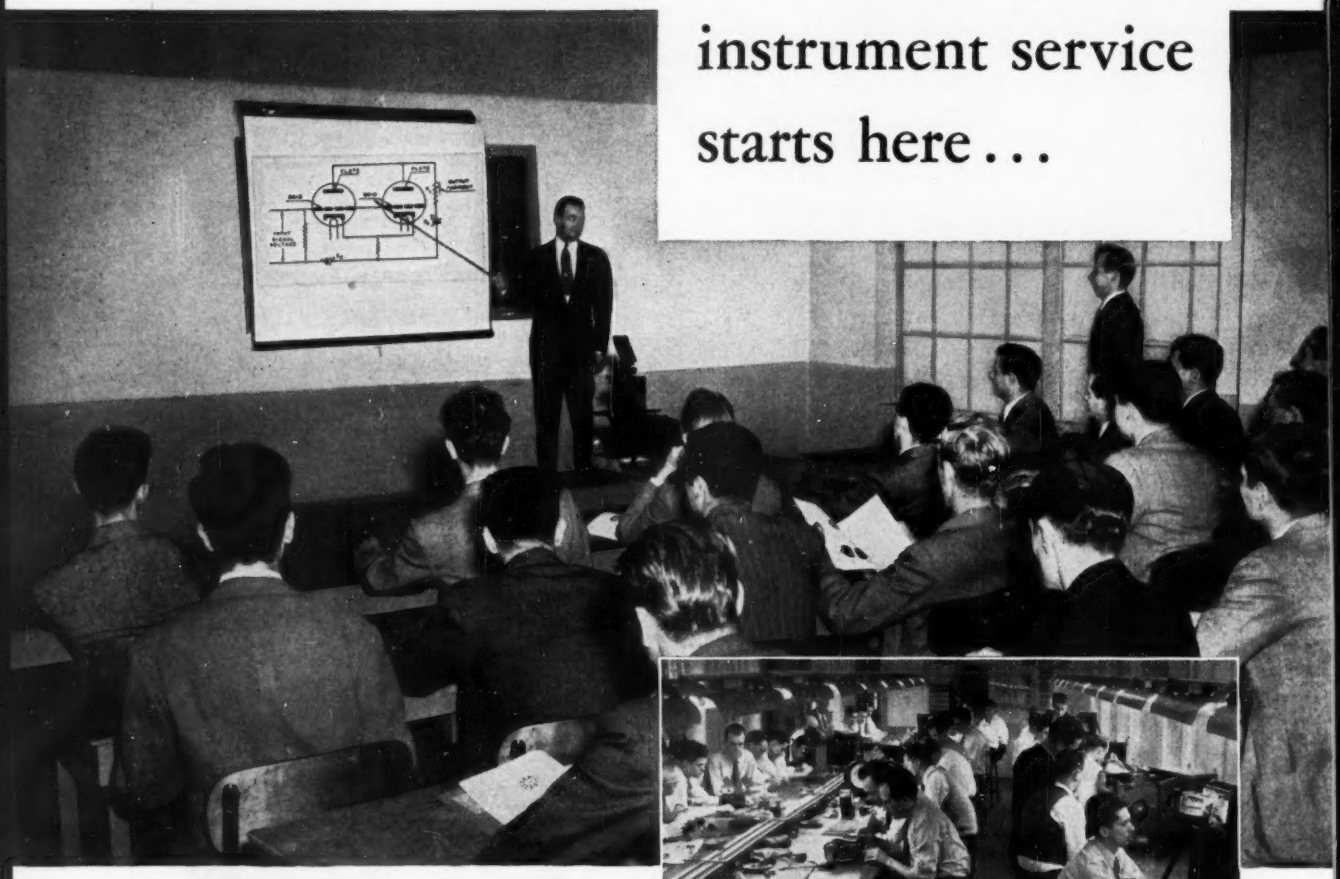

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OPINION . .

"Tops in Field . . ."

TO THE EDITOR: . . . I am a constant reader of your publication and feel that without doubt it is tops in its field.

RUSSELL A. FOUST, JR.
Chemical Engineer
Hingham, Mass.

Urea Processes

TO THE EDITOR: We have read your news article "Five Ways to Make Urea" (Dec. 13) with considerable interest . . . It is unfortunate that it contains several statements with reference to the Inventa process . . . and also to other processes reportedly in use in Europe which we know to be inaccurate.

The Swiss Inventa process was developed by Holzverzuckerungs (Hovag) A. G. of Ems, Switzerland, an associated company of Inventa. The Hovag urea plant has been operating with the complete Inventa process in regular commercial production for over three years . . . uses the special alloys you mentioned and the absorption-desorption recycle system for separation of ammonia and carbon dioxide from the unreacted carbamate.

Corrosion has been a problem in most processes; however, your statement that ". . . corrosion is a persistent headache in any of the many processes available" is completely in error. This problem has been successfully overcome with the Inventa process as practiced at Hovag and as offered by us to U. S. and Canadian producers . . . To our knowledge, it is the only process which has overcome corrosion . . . the solution of this problem is not a claim . . . has been proved in commercial operation.

While not explicitly stated, it is implied that the two urea plants in Switzerland are utilizing the I. G. process with a hot compressor recycle . . . To our knowledge . . . the process proposed by I. G. Farben has never functioned on a commercial scale . . . has been tried only on a development basis. One producer spent considerable sums on it. . . abandoned it as impractical and unworkable . . .

The consultant [you quoted] missed the nail by a wide margin when he said Du Pont and Allied are the only ones with plants beyond the pilot stage . . . that anyone else is just guessing on costs.

Our designs . . . cost estimates are based on a plant in regular commercial operation . . . While the capacity of this Hovag plant is 20 tons/day, the economy of operation

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LEMOL 42-88 — High viscosity, partially hydrolyzed . . . Protective colloid . . . Emulsifying agent . . . Thickening agent . . . Extender for polyvinyl acetate emulsions . . . Remoistenable adhesives . . . Warp size for viscose and cotton yarns . . . Water soluble unsupported film.

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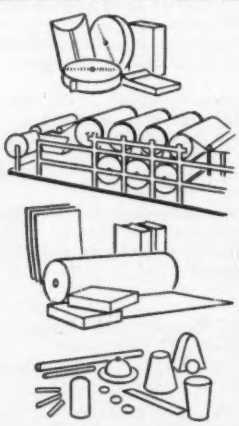

LEMOL 5-88 — Low viscosity, partially hydrolyzed . . . Most water sensitive grade . . . Emulsifying agent . . . Remoistenable adhesives . . . Warp size for acetate and nylon yarns . . . Least sensitive to added salts . . . Temporary protective coatings . . . Temporary ceramic binder.

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OPINION . . . . . .

with the Inventa process is such that Hovag has found it profitable to sell substantial quantities of urea on the U. S. market . . .

W. H. Stark
Executive Assistant to the President
The Vulcan Copper & Supply Co.
Cincinnati, Ohio.

Thanks, Reader Stark. We are glad to report your reassertion of what we said re corrosion: "Vulcan is convinced that its process is the solution to corrosion problems." Our comment concerning foreign production was, admittedly, somewhat ambiguous in its phrasing. However, executives of Norsk-Hydro maintain that their Norwegian urea unit—which has a capacity of 11,000 metric tons a year—utilizes the I. G. Farben process.—Ed.

Two-in-One Phrase

To the Editor: . . . Enjoyed your report on the Chemical Market Research Association meeting (Dec. 27) . . . with your usual fine style of getting the most in the fewest words.

However, may I offer one minor correction: The phrase "growing trend toward larger molds—of the shell type—for one piece cabinets and foundry applications" includes two separate ideas which I doubt that you intended to mix.

V. P. Gordon Brown [in his paper] referred first to larger molds for making one-piece radio and TV cabinets, and secondly to larger shell molds for foundry applications . . .

W. A. Keutgen
Bakelite Co.
Bloomfield, N. J.

You win, Reader Keutgen, We overcompressed that phrase.—Ed.

You're Invited

To the Editor: . . . Our library proposes to make a collection of bulletins published by manufacturers of industrial chemicals . . . make it available to companies and individuals engaged in the development and improvement of chemical-containing products. . . .

It will be restricted to specialized chemicals . . . limited, for the present, to chemicals used in the manufacture of abrasives, adhesives, caulking compounds, cements, coating agents, cosmetics, deodorizers, depilatories, finishes, flame-proofers, fluorescent paints and dyes, fumigants, germicides, glazes, paint and varnish removers, insect repellents, insecticides, mortars, polishing and buffing compounds, rubber, sealers, surface-active agents and waterproofing agents.

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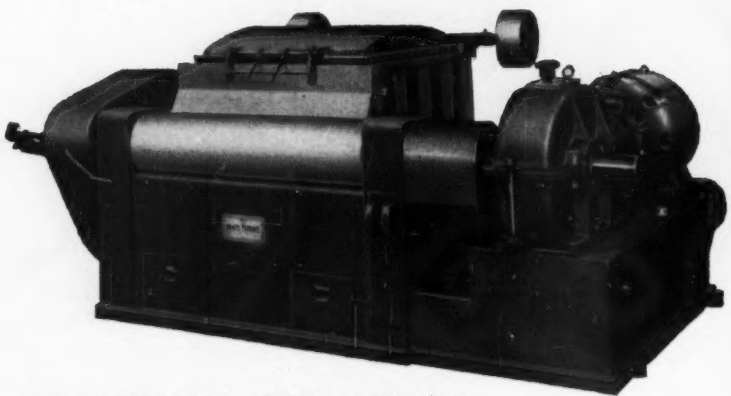

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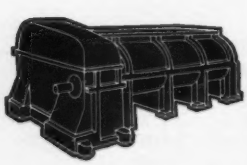
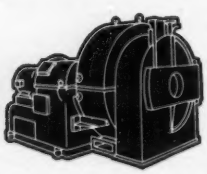
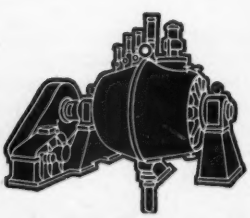


EQUIPMENT FOR FOUNDRY INDUSTRY



CENTRIFUGALS



EQUIPMENT FOR RAYON PRODUCTION

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OPINION . . . . . .

After the literature on these materials has been organized . . . files on a further list of products are contemplated.

Chemical manufacturers are asked to . . . send all available literature to: The Cooper Union Library, File of Current Information on Industrial Chemicals, Cooper Square, New York 3. . . .

EDWARD F. FERRAND, JR.
Assistant Professor of Chemistry
The Cooper Union for the Advancement of Science and Art
New York, N. Y.

Plenty of Kettle

TO THE EDITOR: . . . Your statement re the recently constructed Reichhold Chemical outdoor kettle (Nov. 29) . . . it may be the largest but it is not the first north of the Mason-Dixon line.

I ran a similar type installation with a 400-gallon kettle for S. B. Penick & Co. (Lyndhurst, N.J.) as far back as 1941. . . . We were using the apparatus to make nicotinic acid from Russian supplies of nicotine sulphate. . . .

Good luck to you . . . for the continued output of a top-notch technical news magazine. . . .

I remain a contented reader . . . chlorophyll notwithstanding. . . .

ROBERT M. SANDRI
Technical Director
Brookdale Laboratories
Bloomfield, N. J.

You're right, and so are we, Reader Sandri. Many a small, medium, and fairly large outdoor kettle has been installed in the North, but none as large as Reichhold's whopping unit, which can handle 25 tons of resin at a batch.—ED.

Aids? Hinders?

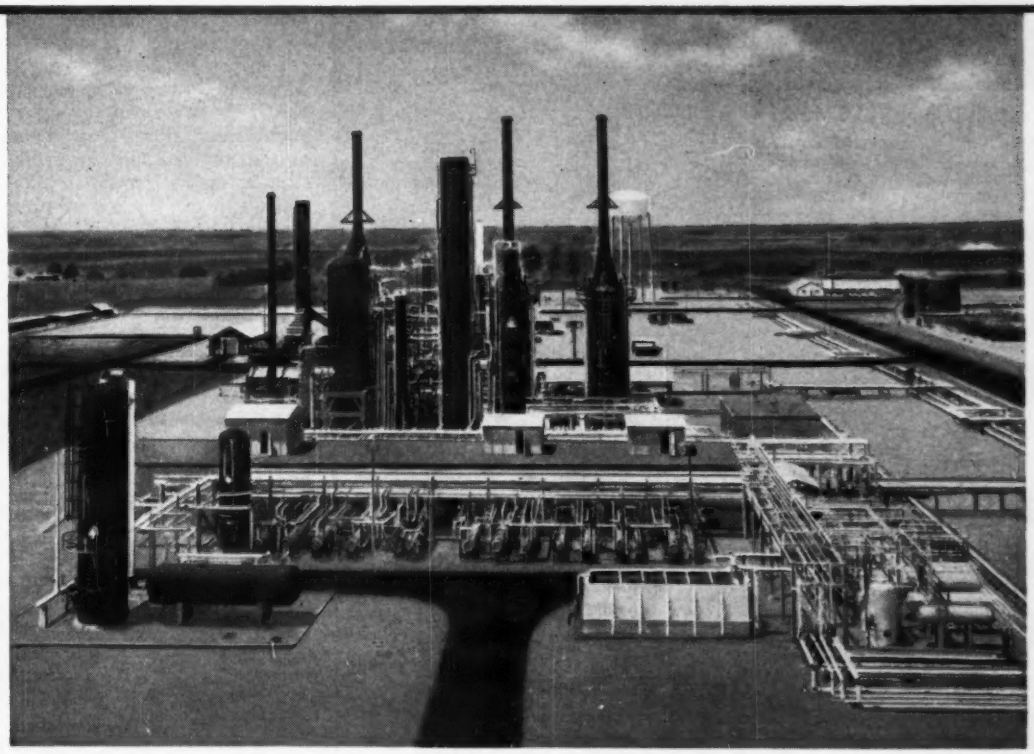
TO THE EDITOR: We were very much interested in the remarks of your Newsletter (Dec. 13) that the Federal Government "also aids" by authorizing foreign nations to buy chemicals under Mutual Security Agency grants. The question in our mind is, Are these really aids?

We had been doing a reasonable volume of business with Formosa,

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: W. A. Jordan, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

NEW HORIZONS



The Crude Distillation and Vis-breaking Unit of Sarnia Refinery, designed by Badger Process Division, processes 20,000 barrels per day of Alberta crude oil

Sarnia Refinery of Canadian Oil Refineries, Limited, is the first large, integrated refinery in Canada built for processing Canadian crude oil. It brings to this rapidly growing region the last word in technological progress in the field of petroleum refining. Such progress means better quality of product and greater efficiency in operation. Design and construction of the refinery were managed by Stone & Webster Canada Limited, utilizing the facilities of Stone & Webster Engineering Corporation.

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DVB, 40-50% is composed of the isomers of divinylbenzene and ethylvinylbenzene and some diethylbenzene. This grade is particularly useful for applications which require a high proportion of reactive components.

DVB, 20-25% is composed of the isomers of divinylbenzene and ethylvinylbenzene together with some styrene monomer, diethylbenzenes, toluene, benzene and ethylbenzene. This grade is useful in the production of super-processing GR-S chemical rubbers, styrenated drying oils and other products in which limited amounts of non-polymerizable compounds are not objectionable.

For further information on the properties, uses and reactions of Divinylbenzene write:

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Chemical Division CW-13 Pittsburgh 19, Pa.

OPINION . . . . . .

paid for with their own dollars. MSA stepped in with a "grant," the business was put on a bid and tender basis, and all of it went to England, Belgium, and Japan.

Although the prices were lower than those at which we had been doing business, the cost to MSA of all the formalities involved necessarily forced the total cost to be far higher than if it had been handled through ordinary private channels—of which we are only one. . . .

Insofar as Greece is concerned, it has been the policy to give every corner drug store, so it seems, part of the authorization with the result that the regular importers cannot buy enough to get the lowest price on a quantity basis; the cost of handling the innumerable small lots is necessarily excessive and ultimately at the expense of the American taxpayer.

. . . MSA has built up large staffs in each of these countries who have a vested interest in the continuance of their jobs . . . do everything possible to interfere in the normal operations of trade affecting the countries where they are located. The local firms detest them most heartily, but cannot express their views at the risk of being left out when the money is doled out.

Furthermore, they interfere so much that even when the governments are willing to spend their own dollars to secure much-needed—often military—materials, the local office of MSA takes steps to block the transaction through Washington.

Our own experience has been that the only part of the MSA which has done a good job—in fact an excellent job—has been the Office of Small Business. . . .

In our opinion, the new administration would be well advised to eliminate MSA—with the exception of the Office of Small Business—which should be transferred to the Department of Commerce. . . .

H. I. MALATZKY
Himala International
New York, N. Y.

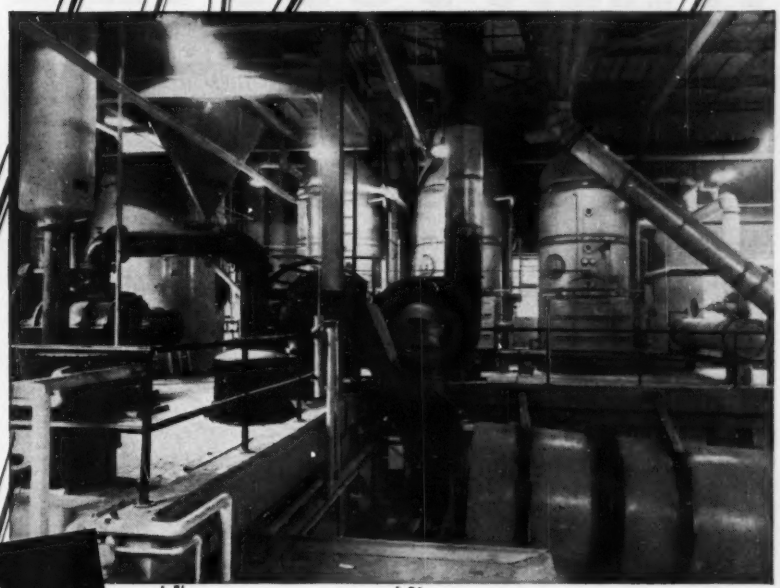
Add One

TO THE EDITOR: . . . We were very interested in your research story on expanded foam plastics (Dec. 20) . . .

You may be interested to note that we are now producing Colfoam . . . a foamed urea-formaldehyde . . . formerly made by U. S. Rubber under the name Flotofoam . . .

B. R. KRASHIN
Vice President
The Colton Chemical Co.
Cleveland, Ohio

This complete ferrous sulfate recovery plant is tubed with ELECTRUNITE Pressure Tubes.



HEAVY CHEMICALS

...another industry that cuts per-hour costs on heat exchangers with Republic

ELECTRUNITE PRESSURE TUBES

In this ferrous sulfate recovery plant, for example, evaporators, calandrias, dryers, and crystallizers are tubed with ELECTRUNITE Heat Exchanger Tubes. Throughout the chemical industries, ELECTRUNITE Pressure Tubes help keep dozens of processes on-stream longer between retubings. Production schedules are maintained; production costs are kept down.

ELECTRUNITE Pressure Tubes are uniform in ductility and corrosion resistance all-around and end-to-end. Full-normalizing assures clean scale-free surfaces.

Tell us what you process in your heat exchangers, condensers, and dryers. We'll gladly tell you which ELECTRUNITE Pressure Tubes, carbon or stainless, will do the best job for you.

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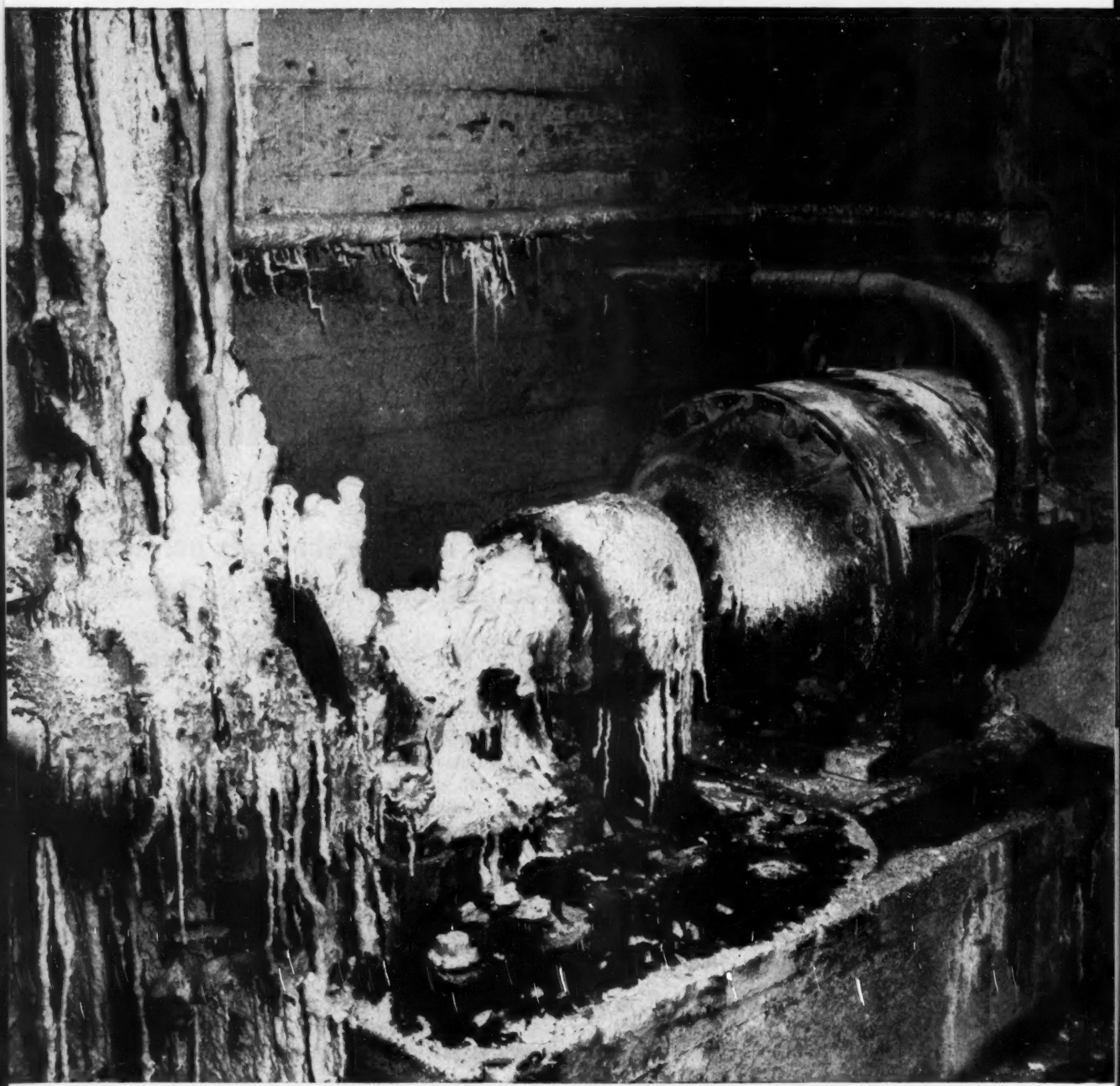
WHEN JOBS ARE TOUGH



CORROSIVE ATMOSPHERE doesn't bother this standard, "off-the-shelf" Tri-Clad motor. Totally enclosed, fan cooled, it runs 12 hours a day, six days a week, driving a flash cooler pump under tough conditions in a chemical plant.

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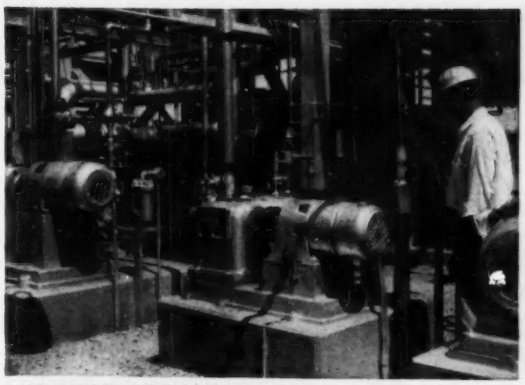
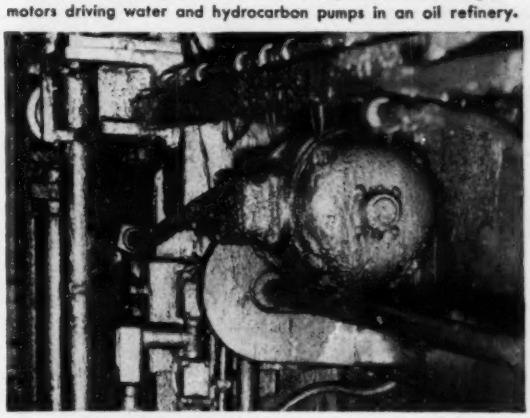


EXPLOSIVE ATMOSPHERE dangers are avoided by using standard explosion-proof Tri-Clad motors, such as these gear-motors driving water and hydrocarbon pumps in an oil refinery.



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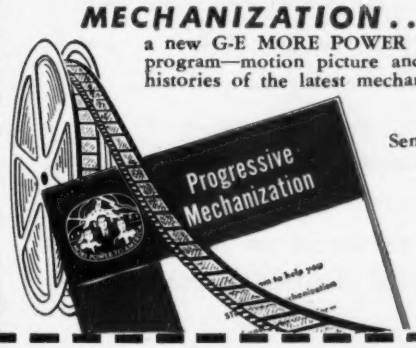

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NEWSLETTER

The way the news breaks, Du Pont is getting more than its share of headlines this week: It has just allotted $600,000 in grants and teaching awards to 19 private colleges and 13 universities; it and Imperial Chemical Industries say they'll be ready to present a plan to end their joint control of Canadian Industries Ltd. ahead of the Jan. 30 deadline (see p. 18); it's accused by the AFL Chemical Workers of interfering in an NLRB election for employees at its Louisville neoprene plant (see p. 23); and it is revealed to have vetoed a suggestion that General George C. Marshall be selected as a General Motors director (see p. 26).

On top of all this are two new developments in the government's antitrust suit against Du Pont and ICI:

The two companies are prepared to end their joint ownership of Duperial-Argentina on these terms: Du Pont will surrender all its Duperial stock, leaving ICI virtually the sole owner; in exchange Du Pont will take cash and Duperial's holding of about 72% of the stock in Ducilo S. A. Productora de Rayon, a Buenos Aires firm that also makes cellophane and nylon. Du Pont hopes to wind up this transaction as soon as possible, fearful that the Peron government might levy a capital gains tax that may amount to as much as $500,000.

The two companies have also just filed their lists of existing and new patents that are subject to compulsory licensing and cross-licensing; but the government is dissatisfied with the Du Pont list because it doesn't give the title of each patent, hence is inconvenient to use for a company that is interested only in certain products. The ICI list does give a title for each patent (albeit some of them are somewhat nebulous—e.g., "Chemical composition," or "Production of novel effects on textiles"). Du Pont lists 1,289 patents and 6 reissues; ICI, 1,138 and 2, respectively.

A process plunge this week is Ansul Chemical's entry into synthetic pyridines. It is now operating a pilot plant at its Marinette, Wis., location, expects to complete around late spring a semicommercial unit that will turn out 500,000 pounds a year of gamma-picoline, alpha-picoline, 2-methyl-5-ethylpyridine, lutidines and collidines (CW Newsletter, Sept. 20, '52). On the agenda for future consideration are pyridine and beta-picoline.

Most of the output will be sold "at competitive prices," says Ansul, but a part will be retained for experimental production of other pyridine compounds.

Also from Wisconsin comes news of an upset. Most pulp and paper makers have trouble disposing of their waste sulfite liquor, but now Marathon Corp.'s Chemical Division (Rothschild, Wis.) is eking out its own "wastes" by buying liquor from another paper manufacturer.

Reason: Its just-completed $500,000 expansion of lignin derivatives capacity takes more raw material than Marathon can supply. The firm will now boost monthly output of lignosulfonate powders by 1¼ million pounds to a total of 4¼ million pounds. Monthly output of liquid products accounts for an additional 3 million pounds of solids. Some outlets: oil well drilling, tanning, water treatment, vanillin, and rubber. Promising new field: ore flotation.

While Imperial Chemical Industries is loosing its ties with one American associate, Du Pont, it is preparing to form ties with another, Visking Corp. (Chicago).

The two firms propose to set up a joint company in Great Britain to manufacture polyethylene film. Extrusion specialist Visking has the film know-how—it says it's the world's largest producer of polyethylene film; and ICI has the polyethylene.

ICI's multifarious and profitable endeavors haven't escaped the notice of the Labour Party's Aneurin Bevan, the fiery, capitalist-baiting "witchdoctor of Ebbw Vale" who would like to nationalize the enterprise.

But "Nye" Bevan's labor cohorts don't see eye to eye with him; the powerful, 8-million member Trades Union Congress, the right arm of Labour party strength, thinks that the doctrinaire drive toward more socialism is less important than the welfare of ICI's workers, who, it seems, aren't faring at all badly under the present capitalistic setup.

There'll be more traffic on the Mississippi and Ohio rivers if Godfrey L. Cabot, Inc.'s latest shipment experiment proves feasible. It just shipped 600,000 lbs. of carbon black by barge from its plant in Franklin, La. to East Liverpool, Ohio, whence overnight service can be provided to rubber plants in Akron. Barge shipments take 30 days against the seven to 10 days required for rail or truck shipment. Thus an inventory must be stored at East Liverpool; but Cabot thinks the saving on freight will more than offset storage expense.

Activated carbon also made news last week as a producer and a user decided to combine forces. Barnebey-Cheney Engineering Co. (Columbus, Ohio), maker of activated carbon, and its affiliated American Solvent Recovery Corp., installer of solvent recovery and air purifying systems employing activated carbon, have merged to form the Barnebey-Cheney Co.

Isolation or proximity? That's a question research directors always have to ponder when a new laboratory site is under consideration. Minnesota Mining & Mfg. Co. cast the die for the former this week when it purchased 125 acres on the edge of St. Paul (Minn.) for a research center. First project: a $3-million building for the firm's central research department; construction will start this spring.

Says Board Chairman William L. McKnight: "In recent years it has become evident that there would be certain advantages derived by isolating scientific laboratories from other phases of . . . operations."

Damned if you do and damned if you don't—that's the fix many defense contractors have found themselves in as a result of conflicting industrial security regulations issued by the three military services.

Munitions Board Chairman John D. Small lashed out last week at the services for failing to get together on uniform procedures. He's had authority to overrule the services, but he hasn't used it yet. His board sets over-all policy, and the services interpret—or misinterpret—it in their separate regulations. Now, he says, a plant having contracts from two services can't live up to one's rules without breaking the other's.

First came Krilium, now comes Folium. Capitalizing on the outlets developed for its soil conditioner, Monsanto is now introducing Folium, a water-soluble fertilizer containing 20% each of nitrogen, phosphorus and potash. Now being manufactured it will be introduced to home gardeners, nurseries and greenhouses within a month.

. . . The Editors

SODIUM METALLIC

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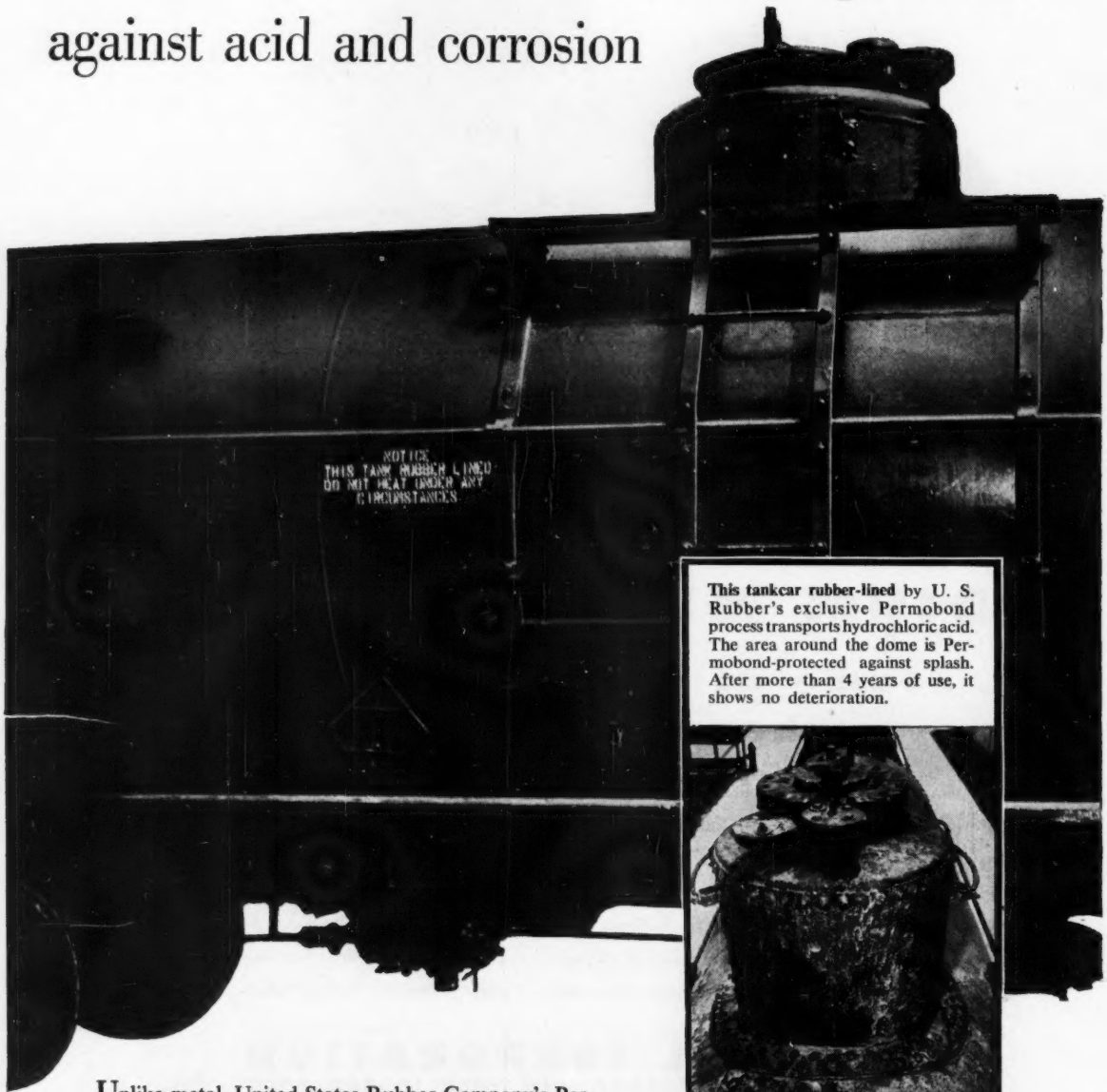
CW 1-17-53

How U. S. Rubber's Permobond protects against acid and corrosion



This tankcar rubber-lined by U. S. Rubber's exclusive Permobond process transports hydrochloric acid. The area around the dome is Permobond-protected against splash. After more than 4 years of use, it shows no deterioration.

This dome, not protected with Permobond, has been in service only two years and already needs replacement. Original Permobond protection would have cost only a fraction of the total charge for this expensive replacement.

Unlike metal, United States Rubber Company's Permobond linings are not affected by acids and gases. Permobond linings are impermeable, and can be bonded or applied to almost any fabricated metal section, big or small, simple or complex. They save untold millions in replacement costs every year. United States Rubber Company engineers will gladly discuss your corrosion problems with you. Very often they can install and thoroughly vulcanize Permobond to existing equipment. Write to address below.

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BUSINESS & INDUSTRY . . . . .

Expansion Recap

Last week, NPA chemical division's able statistician, Frank Hoffheins, ran his eyes down the lists of expansion goals and tax write-off certificates, came up with the fact that already-planned expansion will virtually cover all but 12 of 57 goals.

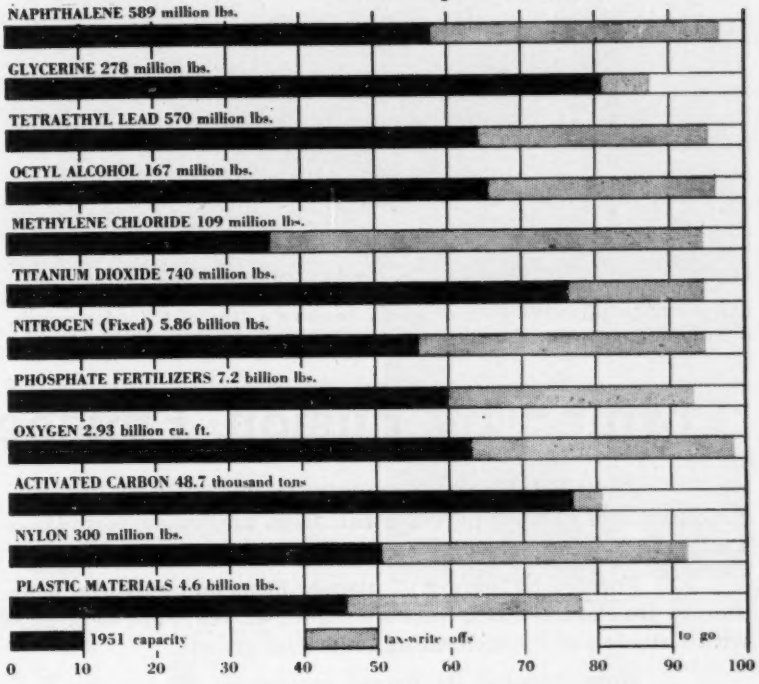
Occasion for the tabulation: the establishment of the final "guns plus butter" mobilization program.

But progress on the remaining 12 is not what it might have been. On four of the eight which were set by last August (*CW, Aug. 23, '52*) certificates since turned back covered more capacity than those newly issued.

Where the government needed 23 million pounds more glycerine capacity to meet its goal, it now needs 35 million, 12.6% of its estimated 1955 total requirements (*see chart*). Where its nitrogen and carbon black goals were complete, it now desires capacity for 152 thousand more tons of nitrogen, and 19 million pounds of black. It will issue certificates for 1,038 million pounds more capacity now, compared to 993 million.

The figures would seem to show that despite government encouragement of expansion, companies are reluctant to spend their money on projects their market research men would not also approve.

STILL TO GO– on DPA Expansion Goals



Longhorn Roundup

This week Tuesday, the 181 members of the Texas legislature gathered in Austin for the opening of the state's 53rd legislative session. And the eyes of Texas chemical manufacturers were upon them, since they almost certainly will consider two subjects of prime chemical interest—taxation and water conservation.

As with legislatures in other states, a prime consideration of the group will be to find new sources of revenue. And the chemical process industries could easily feel the brunt of any new taxation schemes.

Most likely sources of additional funds are natural gas producers, distributors and users. Two years ago, the legislature passed a law placing a tax on the exporting of gas from the state. But this law soon met a court test, unsettled as yet. The tax has brought about $1 million a month into the state treasury, but most of this money is in escrow, waiting legal determination. There is little chance that the cases will be settled before the end of the legislative session.

And so the legislature has two alternatives: It may try to revise the natural gas gathering tax law (which the courts have already invalidated); or it might start all over again on gas taxes, writing a law putting a substantial tax on gas which is exported as well as that consumed in Texas. In this case, the tax may be moved from the producer and royalty owner to the companies owning pipelines.

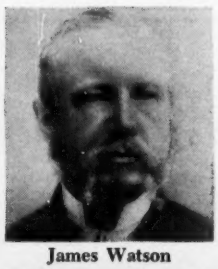
Chemical Tax: Some legislators feel strongly that several industries not included under the present omnibus business tax law are escaping their share of taxation. The last legislature attempted to include the booming chemical industry under the law.

The effort, which will be repeated at this session, has chemical companies a bit worried. Several companies have urged some type of joint action to their confreres, but such plans have not as yet crystallized.

Water Worries: The 100-member water resources committee appointed in 1952—which saw an almost statewide drouth—made five suggestions to the legislature:

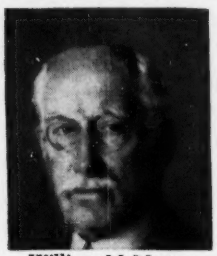
- Submit a constitutional amendment to create a fund to finance construction of dams, reservoirs and other water storage projects. Money would come from fees for surface water.
- Increase the power and authority of the water engineer board.
- Set up a group to study the long-range outlook for water supplies, and to develop a program to use this water most efficiently.
- Create a water poilution advisory council to encourage and conduct studies and distribute information on how to curb water pollution.
- Provide funds for the utilities control commission to cap abandoned oil or gas wells (which cause pollution of water courses) in those cases where the owners cannot be compelled to cap them.

COMPANY HEIRLOOM: Relic of Acadia Powder Co., one of CIL's forerunners, this stone hut served as a powder magazine in Nova Scotia.

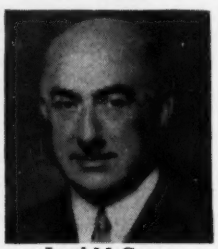


James Watson

Thomas Brainerd



William McMaster



Lord McGowan

FAMILY ALBUM: They helped build CIL.

Formed by Fusion, Finished by Fission:

From batching black powder in stone huts to big-scale production of everything chemical, from antifreeze to nylon—that's the success story of CIL.

Formed by merger of pioneer firms and nurtured since then by Du Pont and ICI, this concern for 42 years has kept pace with Canada's still accelerating industrial growth.

Now, because its parent companies are on the U. S. Justice Department's antitrust griddle, CIL faces a break-up that might jar chemical export-import channels into a new pattern.

A mammoth axe is being forged this week for a chopping operation to carry out the order of a U.S. Court that the largest chemical firms in the United States and Britain must end their joint control of Canadian Industries Limited.

By Jan. 30, Du Pont and Imperial Chemical Industries must present to Federal Judge Sylvester J. Ryan in New York their proposal for putting that order into effect. Within 60 days after that, the U.S. Justice Department may suggest changes in the Du Pont-ICI proposal. After the court has approved a plan, it must be carried out within one year.

Division Is Likely: The parent companies have indicated that they'll suggest that CIL, a 42-year-old corporation now worth around $285 million, be hewed into two separate companies, with Du Pont the major stockholder in one and ICI holding controlling interest in the other. At present, Du Pont and ICI each own about 42% of CIL's common stock. Remaining common shares and all preferred stock are held by the public, including CIL directors, employees and pensioners. CIL says that "by far the greatest number" of these minority and preferred shareholders reside in Canada; most of the others live in the U.S. and the United Kingdom.

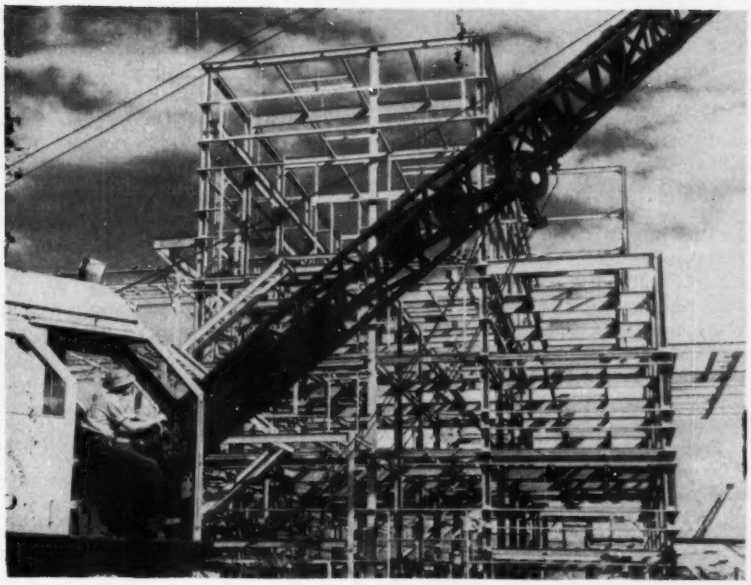
Splitting up into two smaller companies would be a bitter pill for CIL, which prides itself on having remained geared to its country's expanding need for chemicals: "Its continuing growth as a company reflects the industrial advance of the nation whose people it serves." And the pill is all the more distasteful to Canadians because it is being administered by a U.S. court under a U.S. law, the Sherman Act.

One concrete economic reason for CIL's antipathy toward the court's ruling: CIL doesn't want to lose the manifold benefits of the extensive, expensive research work carried on by its parent companies. CIL frankly acknowledges: "The inventions and knowledge which flow to the company as a result of its association with ICI and Du Pont are of the greatest value and exceed those obtained from its own research efforts."

Rock Hut Background: The proposal now being drafted by attorneys for Du Pont and ICI will apply also to two other jointly controlled foreign companies, Duperial-Argentina and Duperial-Brazil; but CIL so overtowers those two subsidiaries in business magnitude that public interest will be largely focused on the Canadian concern.

Although its present name was not adopted until 1927, CIL's roots reach back to 1862 when James Watson (described as "a canny Scotchman") founded the Hamilton Powder Co. to make black powder. That blasting agent was in big demand in that era for construction of railways and canals. Another predecessor company sharing the building-Westward market was the Acadia Powder Co., whose humble origin is illustrated on this page by the picture of its rock hut magazine at Waverly, Nova Scotia.

Watson's firm prospered as the lusty young nation flourished, and in 1878 it built a plant at Beloeil, Quebec, to manufacture dynamite, a more potent blasting material that soon became the company's main product. That plant stood on the site now occupied by CIL's Beloeil explosive works.

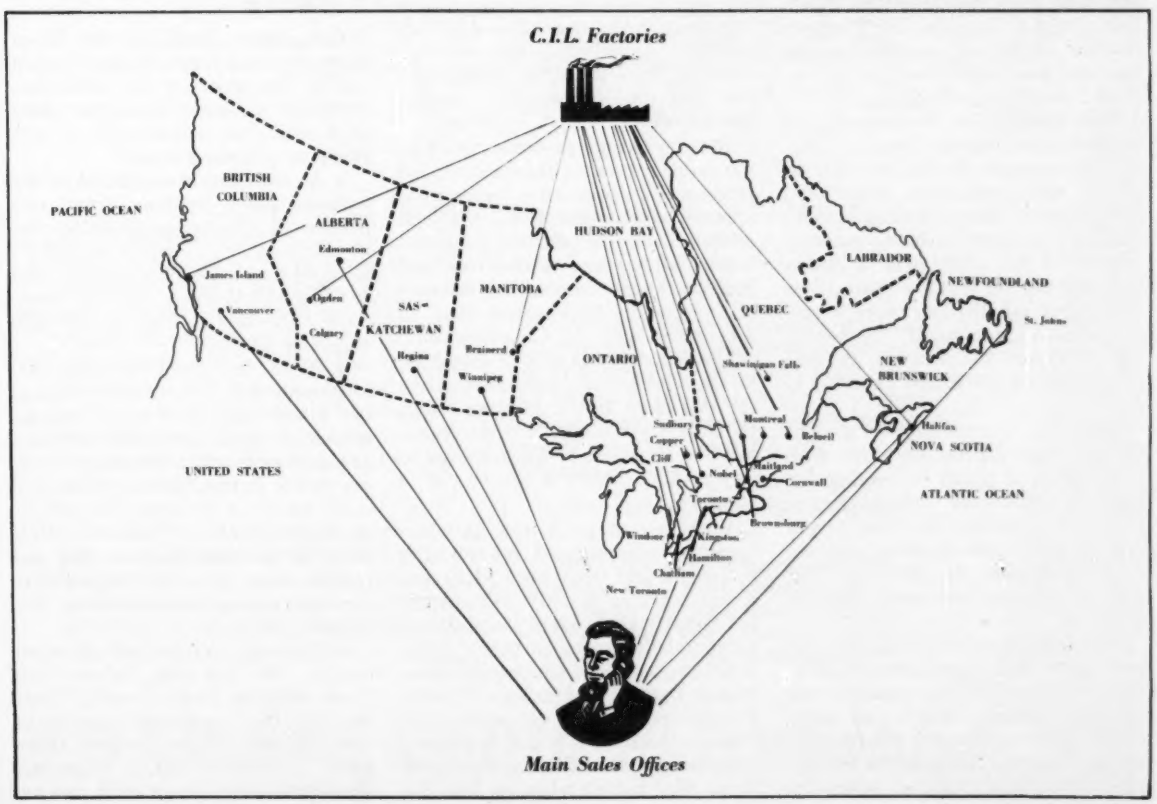


COMPANY SHOW-PIECE: Aimed at making Canada self-sufficient for nylon intermediates, the new Maitland plant will be CIL's biggest.

PRESENT LEADERS: Above, Board Chairman George W. Huggett; below, President H. Greville Smith.

Life Cycle for CIL?

CIL's INDUSTRIAL OUTPOSTS: Not counting Maitland and Edmonton works now under construction, plant-and-office roster now lists 21 factories, 11 main sales offices, plus company headquarters at Montreal, central research laboratories at Beloeil, and chemical warehouse at Toronto.



International interest in potentialities of Canada's baby explosives industry was crystallized in 1876 when Dr. Thomas Winthrop, a physician of Montclair Heights, N.J., reported on his detailed investigation of the Canadian companies and markets. His son, Winthrop Brainerd, later joined the Hamilton Powder Co. and then served as vice-president and director of CIL until his death in 1951.

Multiple Merger: The big banding-together of forerunner companies came in 1910, with the Right Hon. Harry Duncan McGowan playing a major role in coupling the firms. Lord McGowan, who was a member of CIL's board of directors for 40 years, headed ICI as chairman of the board from 1930 to 1950.

The company formed by welding together the Canadian operations of Du Pont, Nobel's Explosives Co., and the other concerns was known as Canadian Explosives Limited, and William McMaster was its first president. It had seven explosives plants, a factory to provide acids for those plants, and a cartridge plant. The acid factory also made some fertilizers, thus serving as the starting point for CIL's present vast Agricultural Chemicals Department.

Right after the end of World War I, the company began branching out. It organized three new divisions—Fabrikoid, Paint & Varnish, and Plastics—that are still in business today, except that the Polythene Division has replaced the Plastics Division.

New Name, New Products: As industrialization rushed along in Canada, the company decided in 1927 to go into the manufacture, importation and resale of chemicals. The present name was adopted as being more indicative of the wider field of operations. During the next two years, three new industrial divisions were born—Chemicals, Agricultural Chemicals, and Salt—and the number of employees across the nation mounted to 2,500.

Expansion continued straight through the depression years with construction of plants for making cellophane, explosives, alkali-chlorine, hydrogen peroxide, fertilizer, paint and varnish, caustic finishing and ammonium chloride. By 1939, CIL had 4,400 employess and more than 20 plants.

Still growing with Canada, the company started nylon production in 1942. Post-war expansion has included new plants for finishes, sulfuric acid, pesticides, cellulose sponges, polyethylene tubing, commercial explosives and liquid sulfur dioxide. Expenditures for new plants and buildings has climbed to more than $10 million a year, with two mammoth plants now under construction. The nylon intermediates plant, now being built on a 1,500-acre site on the St. Lawrence River near Maitland, Ont., is scheduled for completion in midsummer. It's called "by far the largest single project yet undertaken by CIL," and the company expects that it will make Canada self-sufficient in adipic acid and hexamethylenediamine. The other major project now a-building is the polyethylene plant near Edmonton, Alberta, which the company hopes to have onstream this autumn.

Protocol Aplenty: With more than 8,000 employees in plants and offices in some thirty cities throughout Canada, with annual income at more than $23 million, and with facilities for producing diverse necessities for an expanding industrial economy, CIL is a highly desirable piece of property—particularly while it's all in one piece.

That's why the eyes of the chemical world will be on this big, balanced corporation during the coming year. A cleavage in CIL's corporate structure might be like a slippage along a geologic "fault" line—a slight shift in bed rock might cause a big change in surface conditions. Apparently Judge Ryan expects that segregation may lead to a new and freer marketing situation; he concludes that CIL and the Duperial companies were "instrumentalities to divide world markets and thus restrain U.S. imports and exports."

But the change probably won't be too sudden, because there's more red tape involved even after Judge Ryan approves a plan for ending the joint control. First, that plan will be placed before CIL's board of directors, and the board will consider the interests of the minority stockholders. Next, in accordance with the Canadian Companies Act, the plan will be submitted to the shareholders themselves. Then the plan goes to the Superior Court of Quebec province, and finally, it must be approved by Canada's Secretary of State before it can be put in effect.

With so many chances for proceedings to be snagged, it's too early to assume that what Lord McGowan joined together in 1910 will now be put asunder. One part of Judge Ryan's order (relating to nylon patent rights in Britain) has been hanging fire since August because of resistance to what Englishmen see as an attempt at "Yankee domination"; and the recent upsurge in price of CIL common stock (from $32 last October to $40 this month) shows that Canadians are confident their chemical giant will continue to live and thrive.

LEGAL

Tennessee Tree Law: Phosphate mining companies in Tennessee would be required to refill cuts when mining is completed under a bill being drawn up for the coming session of the state legislature. State Geologist W. D. Hardeman says the bill probably will be aimed at reforestation of mined-out areas. It will affect companies like Monsanto and Victor, which have options on forest land between Maury and Williamson counties.

•

Chemist Charges 'Smear': Research chemist Thomas J. McNaughton has filed a defamation suit in Federal court in Buffalo, N.Y., against Durez Plastics & Chemicals, Inc., of North Tonawanda, asking for $250,000 in damages. His petition asserts that the company's president, Harry M. Dent, made statements to officials of Borden's Durite Division that were intended to induce Durite to abrogate its agreement to hire McNaughton. The plaintiff, who formerly worked for Durez, says that his good name and reputation were injured by Dent's alleged statements.

LABOR

Unions Show Zeal: If the fervor shown by labor unions during the first half of this month is any indication, 1953 will be marked by rugged efforts to further the unionization of the chemical process industries.

• In one election conducted by the National Labor Relations Board, employees of Unexcelled Chemical Co. at Cranbury, N. J. voted by 350-27 to be represented by United Gas, Coke & Chemical Workers (CIO). Previously, there was no union at this 600-employee plant.

• Bargaining rights for about 500 employees of B. F. Goodrich Chemical Co. (Bells Lane, Ky.) have been retained by Synthetic Rubber Workers Local 72 of the AFL Distillery Workers Union. In the NLRB election, 218 votes were cast for Local 72, 203 for the United Rubber Workers (CIO), and 4 for no union. Machine shop employees voted by 15-11 to switch to the International Association of Machinists (AFL).

• Gas-Coke and the IAM are challenging the left-wing International Union of Mine, Mill & Smelter Workers for the bargaining agency at the Virginia-Carolina Chemical Corp. plant (Charleston, S.C.). Mine-Mill won a plant election in 1951 and ne-

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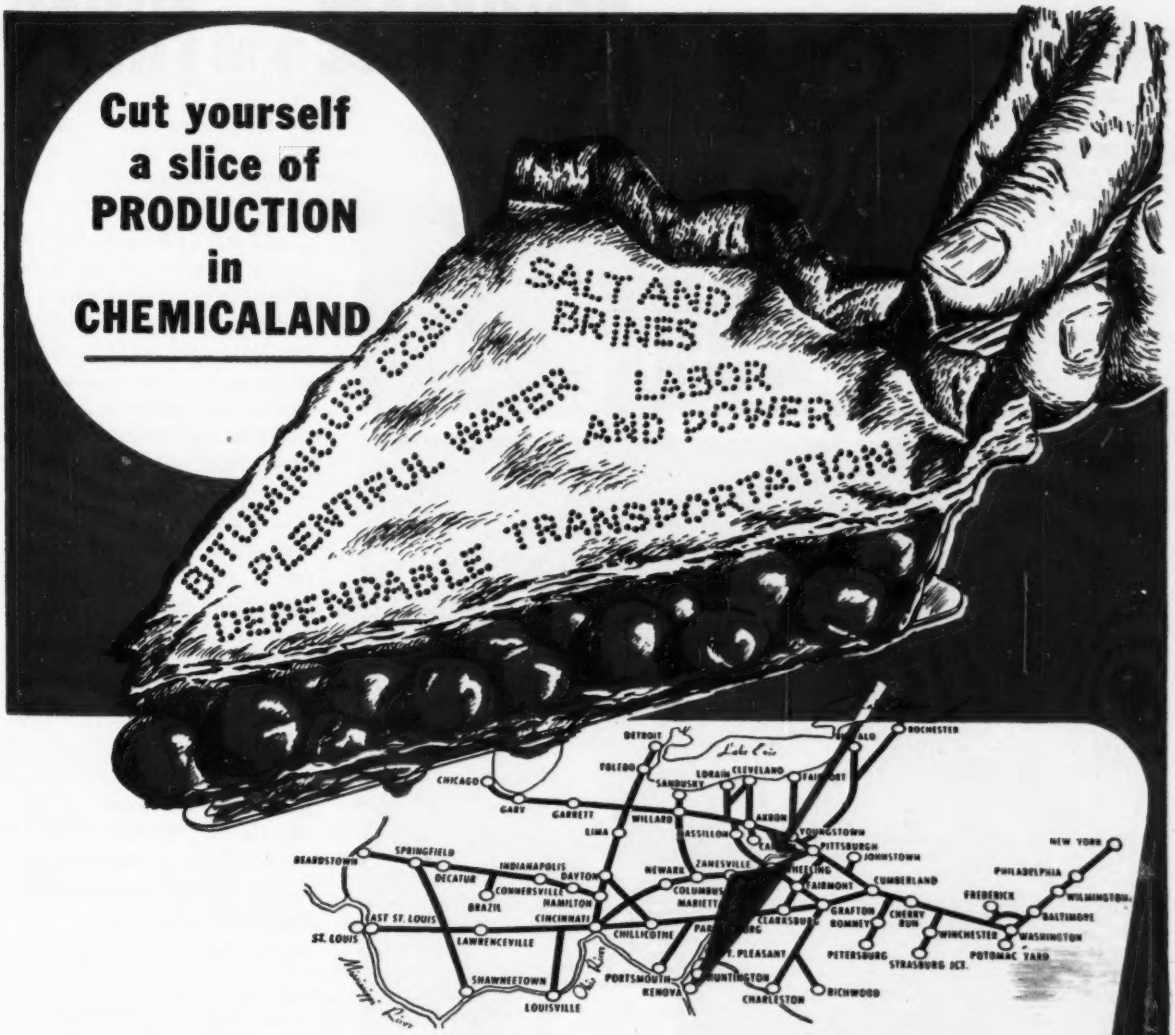

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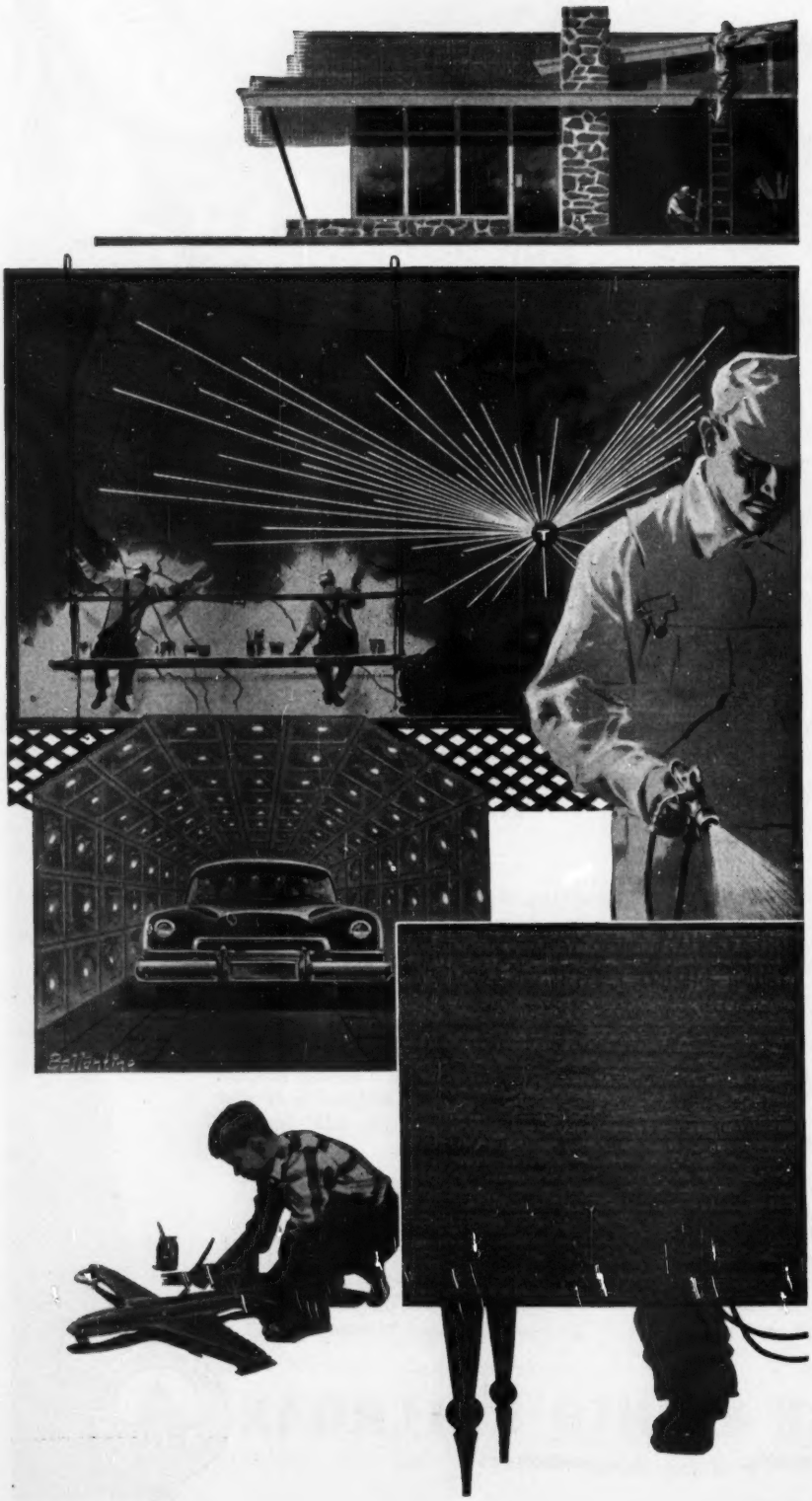

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gotiated a contract that now has expired, and since Mine-Mill's expulsion from the CIO for alleged Communist domination, its members have been openly wooed by various unions.

• In Linde Air Products' Milwaukee plant, employees have voted by 14-1 to be represented by Gas-Coke. The organizing campaign was backed by older Gas-Coke local unions in the area.

• United Mine Workers District 50, which was blocked by a court injunction from certain organizing tactics in one Kentucky town, has gained a beach-head in Louisville through a plant election conducted by the Louisville Labor-Management Committee's chairman. After the 40 employees of Schaefer Varnish Co. chose District 50 as their bargaining agent, the union negotiated a contract providing for an 8¢ increase. Average wage rate now: $1.43/hour.

•

Injunctions and Dynamite: Most heated controversy in the industry's labor relations this winter is in New Iberia, La., where the AFL Chemical Workers' Local 28 is battling on picket lines, through the NLRB, and in state and federal courts to save its contract and its members' jobs. There have been at least four dynamitings since the Jefferson Island Salt Co., which claims that the union's five-month strike has terminated the contract, hired some 200 non-union workers and resumed production. In the latest development, a state district judge has ruled that his court has jurisdiction over the union's suit seeking the reinstatement of some 250 members dropped by the company.

• Another long and bitter strike in Louisiana is at Elizabeth, with Sheriff Ralph L. Thompson admitting that since a paper mill worker's car was dynamited, "practically everyone is carrying some kind of firearm." Picket lines have surrounded the Calcasieu Paper Co. plant for the past four months, and a recent three-day parley between company and union officials was to no avail.

• After maintaining picket lines for more than two and a half years at American Cyanamid's alum and sulfuric acid plant in Joliet, Ill., Gas-Coke Local 119 has sent its members back to work with a 15¢ hourly wage increase. The plant was out of operation throughout the strike, which was the longest ever waged by Gas-Coke.

• Phosphate production in Tennessee has been cut by a strike of some 210 employees of Virginia-Carolina Chemical Corp. at Mount Pleasant. Two other local Mine-Mill unions have threatened to strike at nearby properties of International Minerals & Chemical for the same reason: no agreement yet on new contracts.

• AFL Chemical Workers have voted to strike at Colgate-Palmolive-Peet's big plant at Jeffersonville, Ind., if a new contract is not signed soon. The approximately 1,300 employees have been working without a contract since the old pact expired last Oct. 1. The company reportedly has been asking for a change in the clause on grievance procedure.

• After a 60-day cooling-off period, about 350 production and maintenance workers of Dewey & Almy went on strike at Cambridge, Mass. The employees, who are members of International Chemical Workers Union (AFL), want a 6% across-the-board wage boost.

•

New Year, New Pay Rates: Wage increases are numerous in the chemical industry as 1953 rolls along. Two of the recent pay hikes have been for salaried persons rather than for hourly paid employees.

• In Springfield, Mass., nearly 800 salaried employees of Monsanto are receiving a 1.7% cost-of-living increase. This is the sixth such increase granted since 1950, and the total of those increments now is 22.6%.

• Carbide & Carbon Chemicals is asking Washington approval of salary increases ranging upward from $25/month for certain employees at Oak Ridge, Tenn. The raises would be retroactive to Nov. 1.

• WSB has okayed a 2.9¢/hourly wage boost for 1,544 Bakelite employees at Bound Brook, N.J., who were affected by a widening of grade differentials from 7¢ to 8¢. The workers are members of the independent Chemical Craft Union.

• Lots of back pay is in store for some 450 employees of Huron Milling Co., which makes starch, gum and glue products in Harbor Beach, Mich. WSB has approved a 3¢/hour wage rise retroactive to July 1.

• The old stick-with-it attitude has paid off for employees of Helena Rubinstein, Inc., who stayed with the company when it moved from its old plant in Long Island City, N.Y., to a new cosmetics factory in East Hills, N.Y. Their new one-year contract provides for a 7½¢ wage increase plus an additional 5¢ across-the-board rise.

• Liquid Carbonic is raising wages of employees at its Philadelphia plant by 13¢/hour. Shift differentials are up 2¢ to 6¢ and 8¢/hour. The workers are members of Gas-Coke.

• Wage increases of 8½¢/hour have been granted by Glidden for employees at New Orleans. The contract contains a cost-of-living escalator clause.

• Those URW members who were reluctant to accept the Firestone contract with the 10¢/hour increase last fall finally have agreed to that same pact along with a supplemental contract that details certain rules on working conditions.

• West Virginia Pulp & Paper and United Paperworkers of America (CIO) have negotiated a contract with wage increases ranging from 1¢ to 5¢/hour for employees at Covington, Va., Luke, Md., and Williamsburg, Pa. The new terms are subject to members' ratification.

• A new two-year contract between International Salt Co. and the ICWU calls for a 7¢ across-the-board hourly increase. Wage negotiations may be reopened after one year.

• On petition by Gas-Coke, WSB approved a 4½¢ hourly wage boost for 867 employees of Linde Air Products at Tonawanda, N.Y. Another 400 employees will receive a 3½¢ rise.

•

Unions in Tiffs: In two cities, the AFL Chemical Workers are having legal difficulties this week:

• In Louisville, Ky., ICWU was pleading for a postponement of an NLRB hearing on the disputed election at Du Pont's Neoprene plant.

• At Binghamton, N.Y., a state court has turned down ICWU Local 306's request that Ansco be ordered to arbitrate a labor dispute.

COMPANIES . . . .

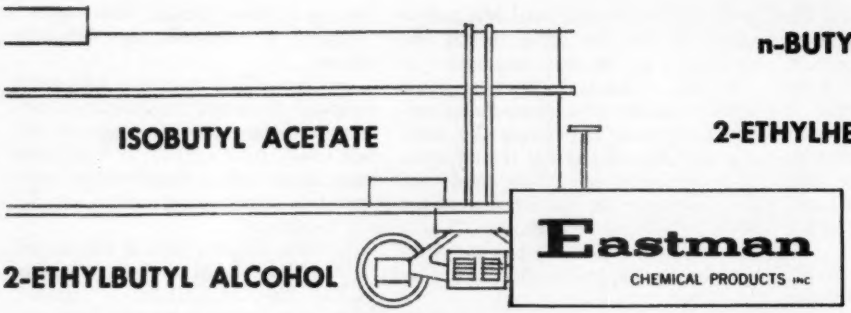
Stock sales were in the news this week as two companies proffered large blocks of common stock for public sale, and a third declared oversubscription of its offering:

• **Hagan Corp.**, Pittsburgh, Pa., will offer 130,758 shares of its common stock to the public sometime in January.

Upon completion of the sale, Hagan will have outstanding 300,000 shares of $1-par-value common stock, representing its entire capitalization.

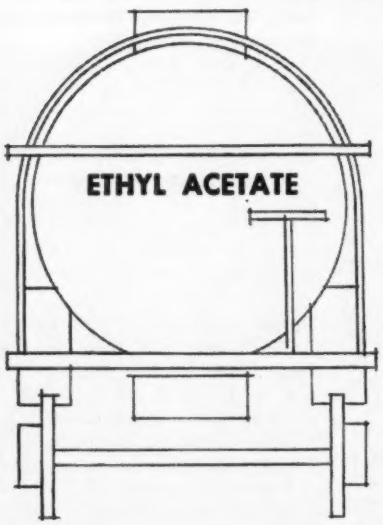
• **Colorado Fuel & Iron Corp.'s** 320,000 new shares of common stock have been offered for public sale. Proceeds, together with other funds, will be used to help the firm's subsidiary, Colorado Steel Corp., buy John A. Roebling's Sons Co. for about $23 million.

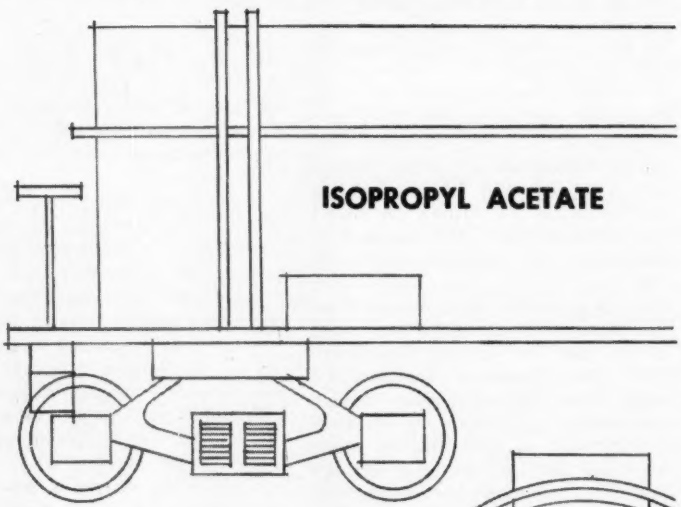
• **Blyth & Co., Inc.**, manager of the underwriting group which offered 653,500 shares of Filtrol Corp.'s common stock for sale, declares that the offering has been oversubscribed. The shares offered were purchased by the



3-METHOXYBUTYL ACETATE

solvents





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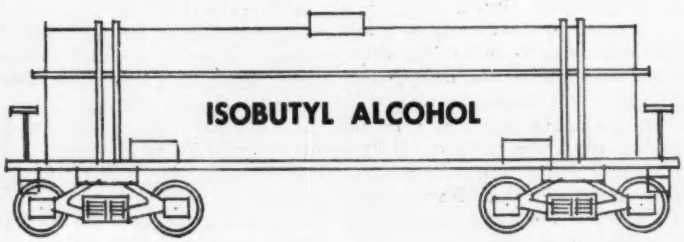

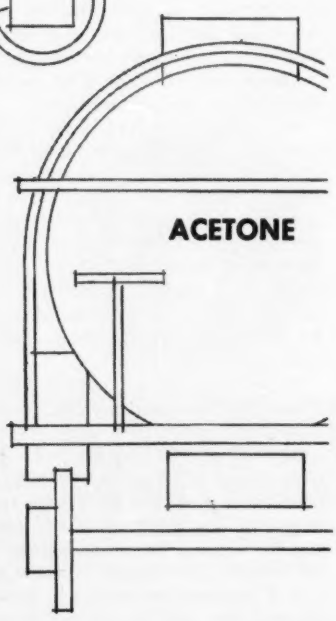

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underwriters from certain stockholders, and Filtrol will not receive any part of the proceeds.

•

Bond sales were also active:

Reserve Mining Co. has sold $148 million of first mortgage 4¼% bonds, due 1980, to a group of life insurance companies. Names of all firms involved in the purchase have not been revealed, but Metropolitan Life Insurance Co. and Equitable Life Assurance Society have been mentioned among the leaders. The financing is reported as one of the biggest private placements in history.

Proceeds will be used to develop a deposit of taconite ore located at the eastern end of the Mesabi Range, Minn. Reserve will spend an estimated $160 million in the construction of a taconite-processing plant with a capacity of 10 million tons of iron ore concentrates annually.

•

E. & F. King & Co. has moved its dry ice department from Boston to Norwood, Mass. as a step in consolidating the company's operations. Re-location commenced Jan. 1.

•

Warren Petroleum Corp. has negotiated purchase of a majority of the outstanding stock of Gregg-Tex Gasoline Corp., Longview, Tex.

EXPANSION . . . .

Plutonium: Blaw-Knox Co., Pittsburgh, Pa. has been awarded a prime contract for construction of a $40-million chemical processing plant, Hanford, Wash. Other contractors engaged in the work: General Electric Co., which will do basic design and engineering, and Vitro Corp. of America, architect-engineers.

The plant will take an estimated two years to complete, and will supplement and enlarge the present plants now processing plutonium.

•

Sodium Chloride: Western Electrochemical Co. has authorized immediate expansion of its personnel at Henderson, Nev., upon completion of construction projects now under way. The program, designed to emphasize development and production work in sodium chloride fields, will double present employment quotas at the Henderson plant.

•

Sulfate of Potash: International Minerals and Chemical Corp. will build an addition to its sulfate of potash facilities at Carlsbad, N.M.

When completed early in 1954, the company hopes to increase production by about 35,000 tons of sulfate of potash a year.

•

Paper: Bowaters Southern Paper Corp. will have planted 3 million pine seedlings on East Tennessee hills by the end of February, in an effort to insure a long-range wood supply for its $55 million newsprint mill under construction at Calhoun, Tenn. The mill is expected to go into production early in 1954.

FOREIGN . . . . .

Paper/Dominican Republic: A contract for construction of a $3-million paper mill at Haina to produce newsprint from sugar cane has been drawn up with government approval. Production, with equipment supplied by British firms, will aim at 8,500 tons-per-year capacity.

•

Paper/Philippine Islands: Plans for establishment of a $25-million pulp and paper project as a joint undertaking of San Miguel Brewery, Inc., and the Bislig Bay Lumber Co., Inc., have been tendered to the Philippine government. Use of lauans, ilang-ilang and gubas, all hardwood species abundant in the Philippines, as raw material of the projected industry has already received the blessing of various testing services in the United States.

Formation of the company awaits assurance by the Philippine government of airtight backing of the project, and the loan of half of the $25-million capital by the Export-Import Bank.

•

Synthetic Rubber/Sweden: A four-year experimental program, financed by the Swedish Spirit and Wine Co. and the State Research Council, claims discovery of a means of producing rubber from cellulose spirit. Its disadvantages: more expensive than American synthetic rubber, and a tendency to crack easily when bent. Advantage: excellent wearability.

•

Rubber/Brazil: The year 1952 closed with the greatest production figures of raw rubber in Brazil since 1910, according to Gabriel Hermes Filho, president of the Banco de Crédito da Amazônia. Increase over 1951 totals exceeded 7,500 short tons.

•

Iron Pyrites/Israel: Engineers, in construction of the Beit Natufa Dam, Galilee, have uncovered a supply of high-grade iron pyrites. Scientists of the Technological Institute, Haifa, are now engaged in establishing whether supplies are extensive enough to justify commercial exploitation.

If sufficient in quantity, the pyrites could replace imports from Greece destined for the new sulfuric acid plant under construction in Haifa for Chemicals and Fertilizers Ltd.

•

Drugs/Australia: The Australian government has formulated a set of measures aimed at the prevention of importation and local distribution of inferior-quality drugs and therapeutic agents.

No difficulty by the large U.S. firms operating in Australia is anticipated, however, in obtaining licenses.

•

Uranium/Canada: Uranium prospectors, on the trail of the world's most coveted radioactive element, have started a second rush into the Beaverlodge area of Saskatchewan. No particular reason for the renewed rush has been offered by the Canadian government.

GEN. BULLENE: No chauffeurs for him.

Business-Type Costs

The new "businessman" administration, when it gets around to looking over the Army Chemical Corps, will find a partial changeover to business-type administration already well under way.

The transition was made through the Army Industrial Fund, a revolving fund set-up which allows Army manufacturing operations to keep much closer tabs on unit costs than previously possible.

Tested first at the Chemical Corps' Rocky Mountain Arsenal (*CW, Sept. 8, '51*), the system has since been extended to other Army facilities, in-

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Anaconda Copper Mining Co., Anaconda, Mont.	Sulfuric acid	1,428,800	70
Warren Petroleum Corp., Panther Creek, Okla.	Propane, butane, and natural gasoline	481,500 128,000	65 40
San Manuel Copper Corp., Mammoth, Ariz.	Copper and molybdenum concentrates	9,484,000 54,154,500	65 75

cluding the Pine Bluff Arsenal, also Corps-operated.

This week (in an evaluation almost coincidental with the inauguration) the Corps' chief chemical officer, Major Gen. E. F. Bullene, pointed with pride to the Corps' "giant-killer" role in overcoming the ogres of waste and inefficiency.

The fund technique, following a test of slightly more than a year at Rocky Mountain, and at two non-Chemical Corps units, now has been approved by the Army for use in about 54 of its major installations.

The system, of course, could not be used for a training facility, but only for a factory-type unit making materials for other parts of the armed forces. Rocky Mountain and Pine Bluff have produced chlorine, napalm and white phosphorus incendiaries.

For Example: The Denver facility, under the system, was given $9 million in cash and about $5 million worth of supplies as its working capital. Its entire expenses—including such overhead as administration, security, medical costs—are met from the fund, rather than from a variety of bank accounts. To every item produced is charged direct material and labor plus overhead charges. The Army's cost figures, though, can't be compared with industry's, since plant depreciation, major property replacements, military pay and allowances, civil service retirement payments and similar costs are still excluded. Records are kept, though, in hopes that these may someday be brought under the revolving fund.

Among the advantages which Gen. Bullene cites: a keen competitive spirit between various departments and a sense of teamwork within departments.

Criticism of the program, states the general, has centered on two facts: it is somewhat costly to install and it "requires a type of accounting specialist not commonly found in government." He feels, though, that the program will attract new talent and know-how from private industry.

But this cost-conscious life isn't all rosy. "For instance," he recalls, "the last time I visited Rocky Mountain I was not assigned a car and driver for my own use. Instead, I had to hitchhike rides from one part of the post to the other . . . I accepted rides from people going where I wanted to go—and liked it."

Antitrust Speedup

A faster gear ratio is being worked out for the wheels of justice in the antitrust case against Du Pont, U.S. Rubber and General Motors in U.S. District Court in Chicago.

With the Government's work as plaintiff in this civil suit under new management due to the sidelining of prosecutor Willis L. Hotchkiss, acting chief Government lawyer E. Houston Harsha has mapped plans for cutting down to about six weeks the time that will be required for presenting evidence. Also, under instructions from the Justice Department in Washington, he has moved that the names of 83 members and in-laws of the Du Pont fam-

HARLAN: For defense counsel, a minor victory.

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ily be dropped from the list of 118 individual defendants.

Point for Defense: This motion, which Judge Walter J. LaBuy has taken under advisement, appeared to be something of a minor victory for the defendants. John M. Harlan, the New York attorney who heads the defense staff, has castigated Hotchkiss' "family conspiracy" theory as "absurd," particularly as to its inclusion of 59 children as defendants.

The 83 persons whom the Government now wants to omit from the suit are those who do not own shares of common stock in U. S. Rubber. Harsha says those persons are not necessary to the case and the evidence against them is not strong enough. "I'm certain their dismissal will not weaken the Government's case," Harsha told the court. "It will give a certain focus in concentrating on those the Government feels are primarily responsible for the conspiracy."

Asked about rumors that the incoming Eisenhower administration might drop the law suit, Harsha declared he had heard nothing about it: "I expect to try this case, and I'm going ahead as planned."

Harlan, whose law career includes service as Assistant Attorney-General under President Coolidge, has charged that this suit is aimed at the "bigness" of the corporate defendants, and that the formal accusations of monopoly and restraint of trade are cover-ups.

Among documents introduced by the Government as evidence when the trial resumed last week: a 1937 letter suggesting that Imperial Chemical Industries, largest chemical firm in Britain, be allowed to buy Du Pont stock. This idea was vetoed by Lammot du Pont.

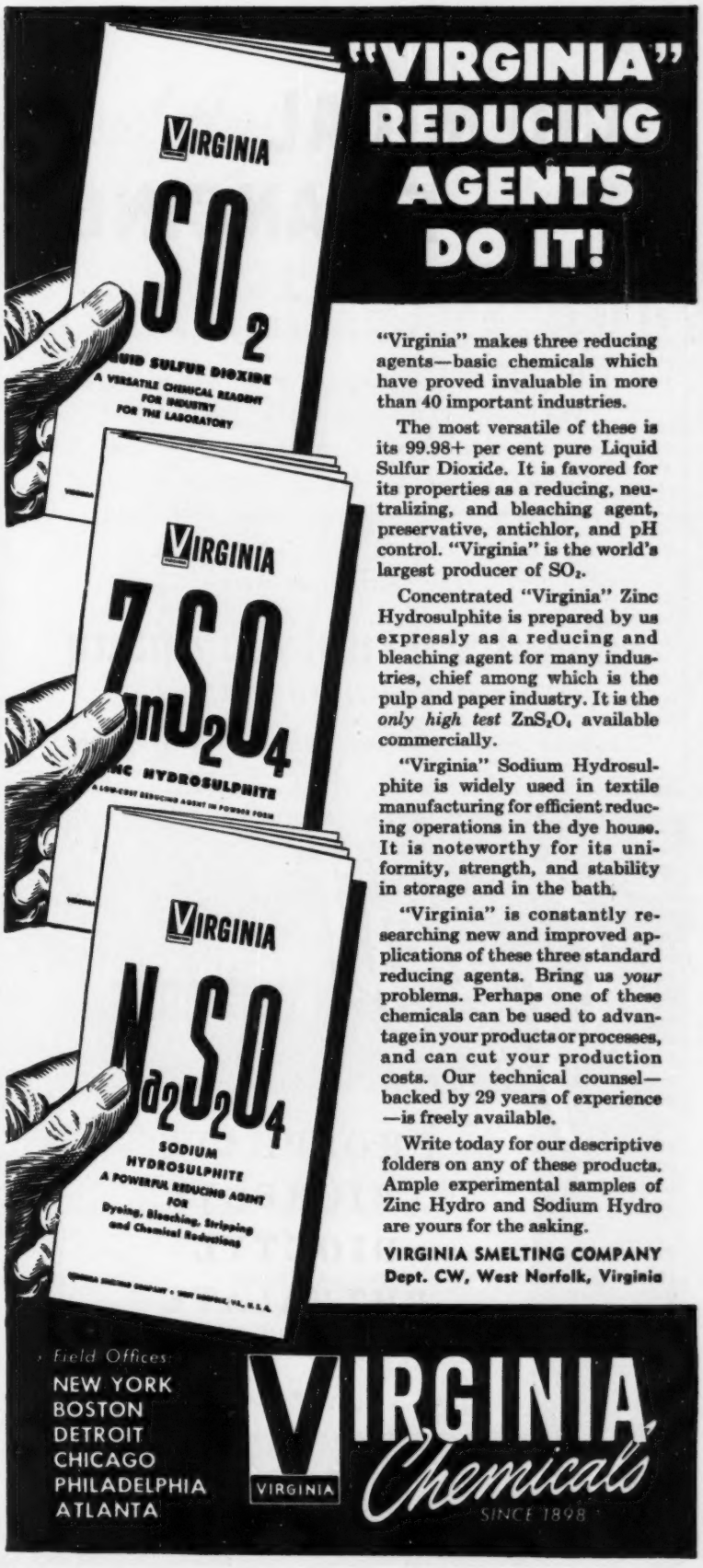
Joint Methanol Venture

Heyden Chemical Corp. and Monsanto Chemical Co. have joined hands in an agreement to build a methanol plant adjoining Monsanto's new acetylene facilities, Texas City, Tex.

Pledged to share equally in both the cost of the proposed plant and in its output (calculated at approximately 25 million gallons per year), the bargain between the companies promises to each an economic supply of methanol obtained from by-product gas from the acetylene operation.

In accordance with terms between Monsanto and Heyden, the common venture will continue for a substantial number of years, and provides for optional termination thereafter.

Commercial production is expected in January 1955.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Joseph McConnell: From president, National Broadcasting Co., to president, Colgate-Palmolive-Peet Co., Jersey City, N.J.

John D. Nantz: To president, Matheson Coleman and Bell, Inc., Norwood, O.

Ernest C. Kontz: To chief sales engineer, Davidson-Kennedy Co., Atlanta, Ga.

Howard G. Vesper: To vice president, Standard Oil Co. of California, San Francisco, Calif.

William R. Geddes: To vice-president, North American Cyanamid, Ltd., Toronto, Canada.

M. F. Meissner: To general manager, metals division, Olin Industries, Inc., East Alton, Ill.

Ben F. Buchanan: To manager, pharmaceutical department, Amino Products Division, International Minerals & Chemical Corp., Chicago, Ill.

Carl W. Bahrt, Jr.: To plant manager, Allied Chemical & Dye Corp., South Point, O.

Frederick G. Huxster: To manager of chemical operations, Explosives Dept., Hercules Powder Co., Wilmington, Del.

Osgood V. Tracy: To president, Enjay Co., Inc., New York, N.Y.

Carl O. Tongberg: To director, research division, Esso Laboratories, Linden, N.J.

J. Thomas Haigh: To sales manager, Schutz-O'Neill Co., Minneapolis, Minn.

Alvin H. Ross: To assistant to the vice president and general manager, Climax Uranium Co., New York, N.Y.

M. E. Parker: To administrative director of production, Eli Lilly & Co., Indianapolis, Ind.

Donald J. Miller: To manager, phenol and heavy chemicals plant, Monsanto Chemical Co., Avon, Calif.

J. E. Johnson: To director of agricultural chemical research, Dow Chemical Co., Midland, Mich.

D. T. Marvel: To vice president for sales, Olin Industries, Inc., East Alton, Ill.

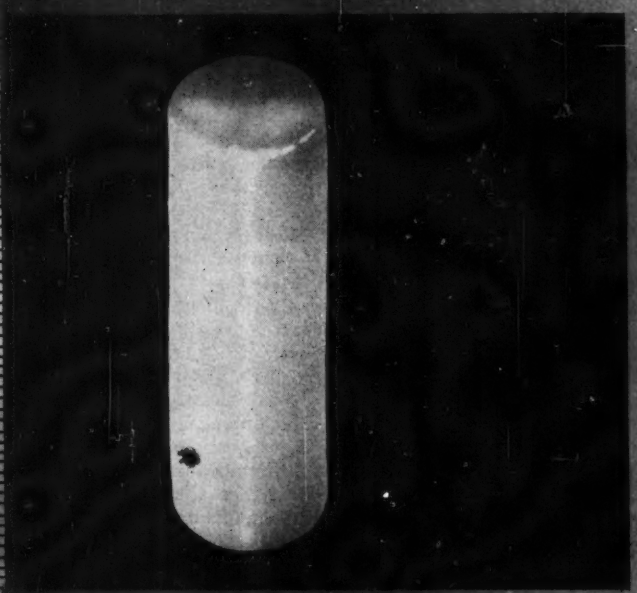
David L. Gamble: To manager of research, New Jersey Zinc Co. (of Pa.), Palmerton, Pa.

Albert E. Ponter, Jr.: To export sales manager, Rayonier, Inc., New York, N.Y.

National Aniline

ORIGINATOR OF THE "EASY-TO-HANDLE"

MALEIC ANHYDRIDE RODS



STILL A LEADER IN COATING RESIN CHEMICALS

Uniform in size, easier and safer to weigh and handle *National Maleic Anhydride Rods* cut costs, improve working conditions, decrease contamination and moisture pick-up. Packed in 250# "Ever pak" fiber drums with built-in moisture vapor barrier, this National Resin Chemical is available in ample quantities for prompt shipment.

National Aniline does not produce resinous compounds nor engage in the molding business. But as a leading producer of basic resin ingredients we welcome inquiries for technical data and samples that may develop wider use of

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Cold Rubber Speed-Up

A new B. F. Goodrich Chemical Co. process slashes synthetic rubber manufacturing time by 50-fold.

Key: polymerization in stainless steel pipes, instead of conventional pressure reactors.

The pipeline process won't supplant conventional synthetic rubber processes, will be top candidate for new plants.

A commercial process to make cold synthetic rubber in 15 to 20 minutes might well have been called a pipe dream five years ago. Last week, the rubber industry discovered that it is a pipe dream come true. And "pipe" is precisely the right adjective; for by means of a newly revealed (*CW, Dec. 27, '52*) B. F. Goodrich-developed process, cold rubber is made 50 times as fast in stainless steel pipes as in conventional pressure vessels.

Secret of the new technique is an extremely active hydroperoxide catalyst. The idea of pipeline synthetic rubber production, in itself, is not strictly new; Goodrich researchers had successfully piloted a pipeline process for specialty rubbers as early as 1947. But the length of pipe required depends upon the duration of the polymerization reaction. Until the development of the new catalyst, a commercial pipeline plant would have been stymied by the prohibitive lengths of pipe needed to compensate for ordinary reaction times.

Now, reports Goodrich President John Collyer, that problem has been licked with far-reaching consequences to the industry. Collyer points out that simplicity and modest equipment requirements of the new process could reduce conventional process costs by half. But you'll be disappointed if you're looking for an early major switch to the new process. For one thing, it can't readily be adapted to existing synthetic rubber-producing facilities. And it's still in the pilot-plant, not yet ready for commercialization.

If the pipeline process does make the commercial grade, however, it will—in the opinion of one industry source—render obsolete existing government cold synthetic rubber plants. How soon that day will come, is still a matter of conjecture. Thus far, not a pound of the new rubber has been produced on a commercial basis.

The development is still in the research stage, was so reported in the recently issued annual report of Reconstruction Finance Corp. RFC's Synthetic Rubber Div. financed the research at Goodrich's Breckville and Avon Lake (Ohio) research centers since its inception twelve years ago.

Like conventional cold rubber, the new pipeline synthetic has about 25% greater tensile strength than general purpose GR-S. Goodrich's Collyer, sees in the neophyte process, "unlimited opportunity for the production of improved rubbers at lower costs . . . for tires and . . . other products."

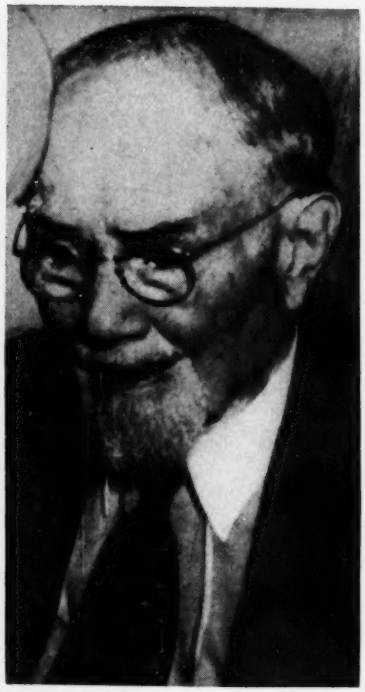
No Quick Change: His optimistic estimate has a measure of justification. But, in the final analysis, the pipeline process is not going to change the face of synthetic rubber manufacture overnight. Aside from its speed, the new process makes a rubber which looks as good as—but not better—than conventional cold rubber. And savings, though significant, are not going to put existing plants out of business.

More likely, the Goodrich-developed process—if it proves out in all respects—will be number one candidate for new cold-synthetic rubber plants. The commercial fortunes of the new process may well parallel the synthetic rubber demand curve.

In any event, pipeline production of synthetic rubber will not work to the exclusive advantage of any firm. Like previous fruits of government-sponsored synthetic rubber research, rights to the process will be available to the industry.

Investment in Mankind

Even in death, publicity-shy Robert Welch—Texas oil and sulfur tycoon—made headlines. The octagenarian's will, made public shortly after his year-end passing, gives $50 million to mankind and 29 individuals. "Mankind" is by far the greater beneficiary; the wealthy Texan earmarked the bulk of his fortune, almost $43 million, for the establishment of a foundation for "scientific research in the field of chemistry."



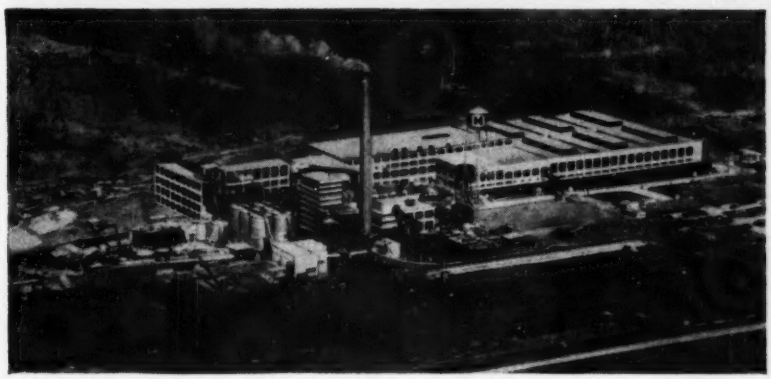
ROBERT WELCH: Chemical research wins a lifetime parlay.

How the foundation will function in dispensing its millions is not specified. But certain stipulations will be binding: For example, the will specifically states that grants or gifts from the foundation shall be used in the state of Texas. And grants to religious organizations, except to educational institutions for chemical research, are forbidden.

In the final analysis, the administrative policies of the Robert A. Welch Foundation (as it will probably be named) will be formulated by its trustees. Filling these posts are Houston businessmen Daniel R. Bullard, president of Welch's Fidelity Oil and Royalty Co.; Clarence M. Malone, director of Houston's Second National Bank; and Wilfred T. Doherty, president of Mound Co., another Welch enterprise. A fourth trustee-designate, P. George Maercky, retired vice president of Texas Gulf Sulfur Co., declined to serve because of poor health.

A success in the Horatio Alger tradition, Welch left his native South Carolina as a youth, settled in Houston. From a start as a clerk with the Southern Pacific Railroad, he parlayed pioneer enterprise and a keen business sense into a fortune in oil and sulfur royalties.

HUDSON MULTIWALL SACKS ARE NOW THE INDUSTRY'S MOST FULLY GUARANTEED



This huge new ultra-modern Hudson mill at Palatka, Florida can make firm promises because it is independent of outside suppliers who may cause delays. Here, every step in the manufacture of Hudson Multiwall Sacks, from tree to the finished product, is under Hudson's exclusive ownership.

INTEGRATED OPERATION BACKS UP HUDSON GUARANTEE

PALATKA, FLA. Hudson is the only Multiwall Sack manufacturer to guarantee its sacks against breakage on the filling or closing machines. The company has enough faith in its product to agree to replace without cost all Hudson Multiwall Sacks that fail on the purchaser's packing or closing machines.

Hudson's fully integrated operation provides the control of quality that such an unusual guarantee demands. Variations from outside suppliers are eliminated. To assure a dependable source of pulp Hudson owns and maintains 435,000 acres of choice timber. The strong, long-fibered Kraft is manufactured with laboratory controlled uniformity. The finished sacks (pasted, sewn, valve, or open mouth) are tailored to your most exacting specifications. And assured delivery is available by rail, truck, or water.

Replaces Multiwall Sacks broken on your packer

NEW YORK CITY. "Our new guarantee to replace without cost every sack broken in packing and closing on your machines," stated T. H. Mittendorf, Hudson's Vice-President in Charge of Sales, "makes our Multiwall Sacks the most fully guaranteed in the industry. This is a big advantage to buyers because now they can count on using every sack they purchase."

T. H. Mittendorf

Mr. Mittendorf further explained, "Until Hudson introduced this new replacement policy, every user had to pay for his own losses for normal breakage on the packing or closing machines. But Hudson's new guarantee has changed all that. Now, when you use Hudson Multiwall Sacks, your original cost for sacks is your final cost!"

Urge Multiwall Sack users to write for facts

The Hudson Pulp & Paper Corp. invites all users of Multiwall Sacks to learn how they can benefit [illegible] using guaranteed Hudson Sacks. Examine [illegible] see this [illegible] and [illegible] are promised!

Send for full details!
Tell me, without obligation, about the many advantages of your new Multiwall guarantee.
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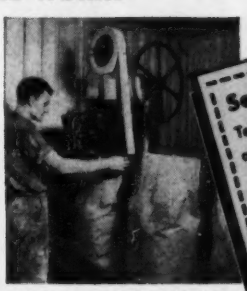
CITY

Hudson Pulp & Paper Corp.
Dept. 123, 505 Park Ave., New York 22, N.Y.

HOW HUDSON'S NEW GUARANTEE WORKS

When Hudson Multiwall Sacks are delivered into your custody, the company's new guarantee goes into full force.

All Hudson Multiwall Sacks must successfully pass your packing machines or be replaced without cost.



All Hudson Multiwall Sacks must pass your closing operations without failure, or Hudson will replace them.

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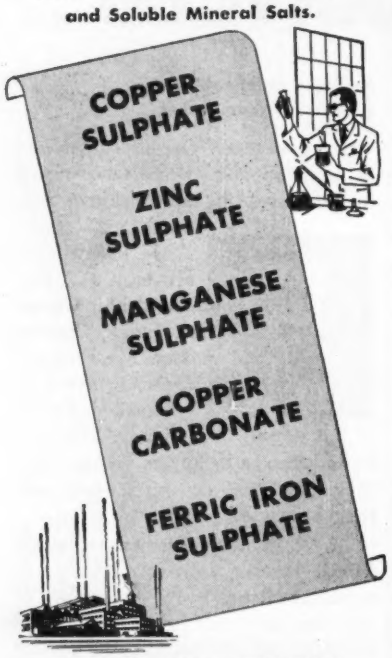

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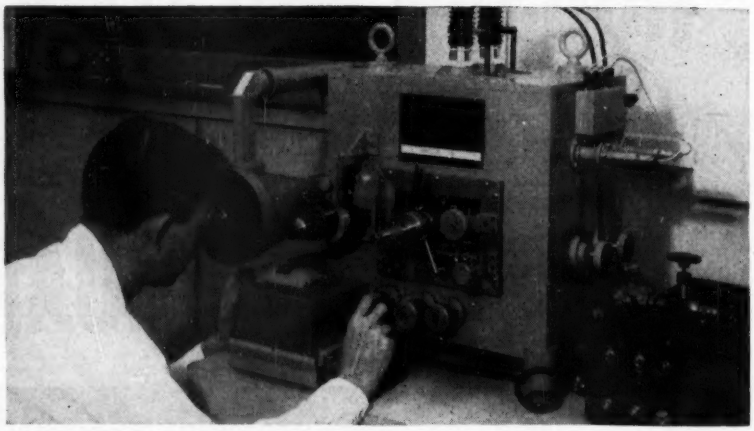
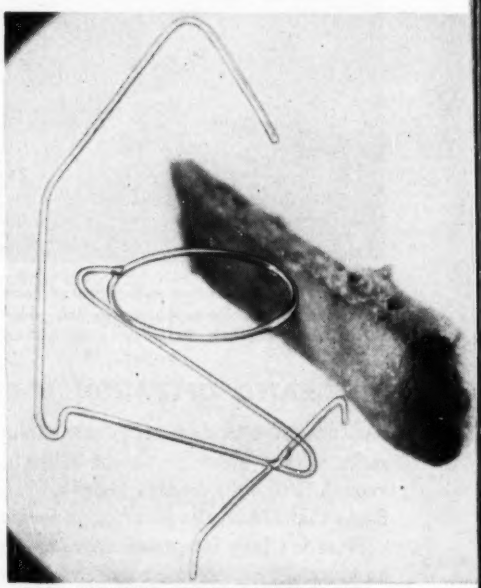


SPECIAL OPTICAL SYSTEM is used to read ultramicro-balance. Complete balance weighs 600 pounds, rests on concrete foundation, independent of building.

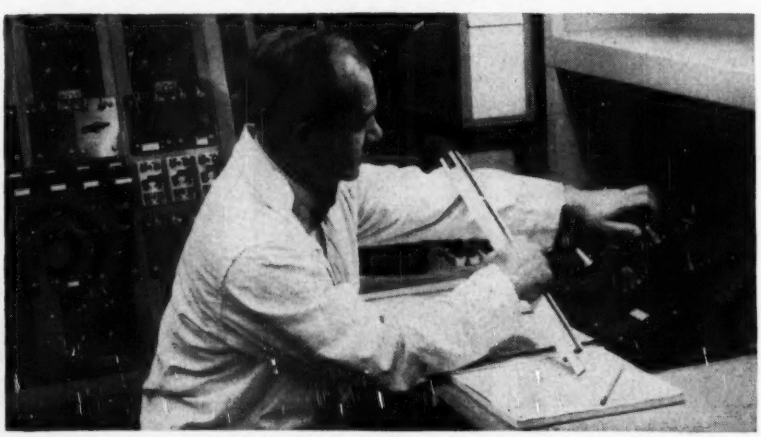
Tooling for Atomic Age Research

In one legendary stroke, the boundless power of the atom has illuminated the dawn of a new era in world affairs, blasted open nature's richest cache of fundamental scientific knowledge. Of the treasures within, such baubles as power for heat, light and locomotion; radioisotopes for research in physics, chemistry and medicine have sparked the popular imagination.

But other lesser known items of this wealth are no less worthy for their potential significance to science and industry. A prime example is the radio-electric effect uncovered by re-

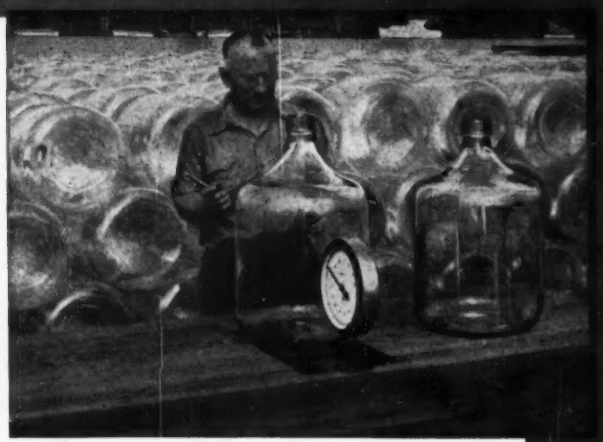


BUT QUARTZ FIBER PANHOLDER, part of actual balancing mechanism, isn't much bigger than match-head.



SLIDE RULE IN HAND, Mound physicist adjusts hypersensitive calorimeter. Instrument measures radioactive heat given off at only 0.0003 cal. an hour.

A CONTINUED STORY BY ONE OF AMERICA'S OLDEST GLASS MANUFACTURERS



The Case of the Acid Carboy

by Gayner

CHAPTER TEN

Meet Norman Ford! He's an interesting man to know, and no doubt the only man in the world who has personally tested and approved over 4,000,000 Gayner Glass Carboys. Over 29 years of service mark Norm as a permanent member of the Gayner oldsters, where longevity is the rule.

For 15 years of his 29, Norm has worked at the testing table performing the "ring test" on 13-gallon bottles. In this test—prescribed by the MCA (Manual Sheet C-3) in compliance with I.C.C. regulation 1A—the bottle is pounded with a 5/8" diameter iron rod for sound and bounce. After years of listening to the ring of the iron, Fordy can find a thin spot by the difference in tone. No mechanical instrument has ever been devised to do Fordy's job accurately and practically. The human element, plus years of experience, still leads the field.

• • •

There are many reasons, in addition to close personal supervision and "know-how", why Gayner Glass Carboys still enjoy top preference in the chemical and process industries after 60 years of service. Just a few of these advantages are repeated here under "Time-proven Carboy Points".

Illustrated brochure on carboys, bottles, boxes and cartons will be mailed promptly on request.

IMMEDIATE DELIVERY ON ALL TYPES FROM 1 LB. BOTTLES TO 13-GALLON CARBOYS.

TIME-PROVEN CARBOY POINTS

- Gayner glass is fully annealed. Maximum shock-resistance for safety.
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- Resistant to chemical attack. No pores or pits to absorb water or chemicals.
- Bottle held firmly by cork wedges. All corners of box securely cushioned.
- Light in weight—low return costs.
- Box is clear, sturdy, seasoned white pine. Bottle easy to install; convenient to handle and store.
- Approved by Bureau of Explosives. MCA Standard 13-gallon carboy bottle.

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50% to 73% CAUSTIC SODA

TAKE THIS COLUMBIA-SOUTHERN CUSTOMER AS AN EXAMPLE. This customer's cost for 50% caustic would be $68,240 annually. Last year it was decided to use 73% concentration at a cost of $65,390 . . . a saving of $2,850 in the first year.

The cost of equipment and installation necessary to effect such savings ran $2,650 . . . or a return of 108% on investment the first year alone!

In addition to the savings in Caustic Soda purchase, such as reported at the left, many manpower dollars are saved because 73% requires less unloading time, for fewer cars are needed to supply the same tonnage.

The unloading method utilized with 73% combines unloading and diluting in a single operation. The assembled unit is compact and relatively inexpensive.

Columbia-Southern's technical staff will be glad to make recommendations regarding the cost and location of the unit and will assist you with the unloading of the initial shipment. Write today for further information. You may realize important savings by switching from 50% to 73% Caustic Soda.

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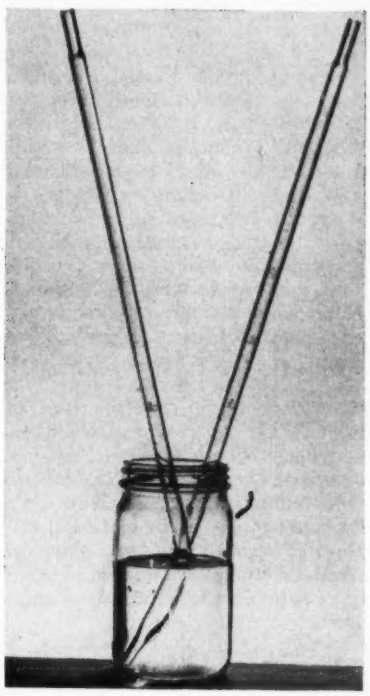
searchers of Monsanto-operated (for A.E.C.) Mound Laboratory (Miamisburg, Ohio). A method of producing an electric current directly from radioactivity, the radio-electric effect has envisioned practical applications in the measurement of corrosion rates, analysis of alloys, studies of surface film growth and determinations of molecular weights of gases.

The treasures of the atomic cache, however, are not free for the asking. One important measure of cost is the development of instruments to fill new and exacting research demands. At Mound Laboratory this tooling for the atomic age in research has produced new and unique instruments such as a micro-balance capable of weight to one-three-billionth of an ounce. Relying on a fine quartz fiber (1/20 the thickness of a human hair) which weighs only 1/1,400 of an ounce, the balance is enclosed in a 600-pound container resting on concrete piers set into bed-rock.

Another item of equipment, specially tailored for a specific atomic application is a micro-calorimeter which accurately measures the heat energy of nuclear decay, even when heat is evolved at the rate of only 0.0003 calories an hour.

Strides toward the perfection of nuclear detecting and measuring instruments provide a sharp contrast in terms to the ultra-micro balance and calorimeter. The laboratory now has Geiger counters which can measure 220 billion nuclear disintegrations a minute (compared to about ½ million capacity of ordinary Geiger counters); if the need arises, other Mound counters can do 100-fold better.



Invisible Detective

SOFT OR PYREX? That familiar laboratory glassware puzzler is answered in jig-time by an ingenious technique credited to Rodney Black, University of Kentucky. Here's how it works: Unidentified specimens of glass are submerged in a solution of 59 ml of carbon tetrachloride and 41 ml of benzene. Pyrex glass has the same refractive index (1.472) as the solution, is invisible in the liquid, like the seemingly floating pipet. The soft glass pipet, on the other hand, is clearly discernible. Recipes other than the benzene-carbon tetrachloride solution may also be found suitable. Example: five parts of benzene to one of ethanol.

•

Cortisone Boost: Mayo Foundation (Rochester, Minn.) researchers, headed by Edward Kendall, have succeeded in jacking the yield of cortisone acetate (obtained from bromodihydrocortisone acetate in the desoxycholic acid synthesis) from 70% to 99%. It's done by new techniques for dehydrobromination and double-bond introduction in the final, most rewarding stage of the bile acid synthesis. Key: substitution of semicarbazide for 2,-4-dinitrophenylhydrazine; hydrolysis of the cortisone acetate semicarbazone in aqueous acetic-pyruvic acid solution.

•

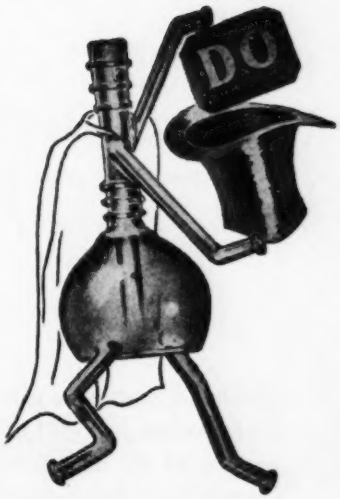
Balance Bypassed: National Bureau of Standards reports the recent development of an electrochemical method for measuring the corrosion rate of steel in soils. It's based on indirect measurement of current in corrosion cells set up in the metal. Says NBS: ". . . success of the work suggests the possibility of valuable practical applications, such as the determination of the corrosion rate of a tank or other underground structure without the need for visual inspection."

•

Trail Blazer: A new and convenient route to highly conjugated aliphatic compounds has been uncovered by chemists of the Du Pont Co. Condensation of acetylene and acrylic derivatives is the crux. Example: Condensing acetylene with methyl acrylate gives a high yield of a new compound, methyl 2,4,6-heptatrienoate.

•

Later than You Think: Development



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RESEARCH . . . . . .

of Goodrich Chemical Co.'s synthetic fiber is, apparently, a lot further along than many suspect. Now, after more than five years of research, the new fiber—believed to be polyvinylidene cyanide—is reportedly getting the once over at independent textile organizations.

•

Removable Neck: The familiar long-necked Kjeldahl (nitrogen determination) flask has been given a streamlined new look by Fisher Scientific Co. (Pittsburgh, Pa.). Acting on a tip from noted Rutgers University analyst William Rieman III, Fisher has added a standard taper-joint to the base of the traditional 500 ml flask. Result: The flask loses none of its value for refluxing operations, is better suited for titrations and additions of reagents.

•

Coconut Threat: Emery Industries, Inc. (Cincinnati, Ohio) has just launched Emery 0-880-S, a new oleic acid. The product permits the formulation of clear liquid soaps containing as much as 39% real soap. Emery says 0-880-S is "designed to replace coconut fatty acid or coconut oil in high concentration liquid soaps," claims such soaps made with 0-880-S show better foam stability, are better detergents, less irritating than coconut soaps.

•

Expansion: Bauer & Black (div. of Kendall Co.) is now expanding research and development potential at its Chicago headquarters. New laboratories will provide greater elbow room for investigations in the biological and physical sciences. The firm's chemical research activities center around studies of natural and synthetic high polymers.

•

Drug Leads: Simple analogs of Chloromycetin have sparked promise of the discovery of a new class of antivirus drugs. Arthur Phillips of Wellcome Research Laboratories synthesized a number of phenethylamine compounds around functional groups (aromatic nitro, dichloroacetyl) found in the Chloromycetin molecule. Several of the compounds showed some activity against Rift Valley Fever virus, but only N-(2,5-dimethoxy-4-nitrophenethyl)-dichloroacetamide showed consistently positive results against the same organism.

•

Eye on Organics: New laboratories going up at Raritan Township (N.J.) will house Davies Nitrate Co.'s expanding research program. Tip: Several organics are now part of the firm's once all-inorganic studies.

Ammonium nitrate plant of Mississippi Chemical Corporation. Designed and built by Girdler.

THIS IS GIRDLER

GIRDLER DESIGNS
processes and plants

GIRDLER BUILDS
processing plants

GIRDLER MANUFACTURES
processing apparatus

Built tight...built right...by Girdler

GIRDLER combines top engineering and construction skills with top quality materials to assure safe, dependable service from your new processing plant. We are especially skilled in handling processes involving corrosive materials reacting at high temperatures and high pressures. Important to the future satisfactory operation of your plant is our thorough understanding of and experience in instrumentation. Find out how Girdler's complete service can be profitable to *you!* Call the nearby Girdler office today.

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The GIRDLER Corporation

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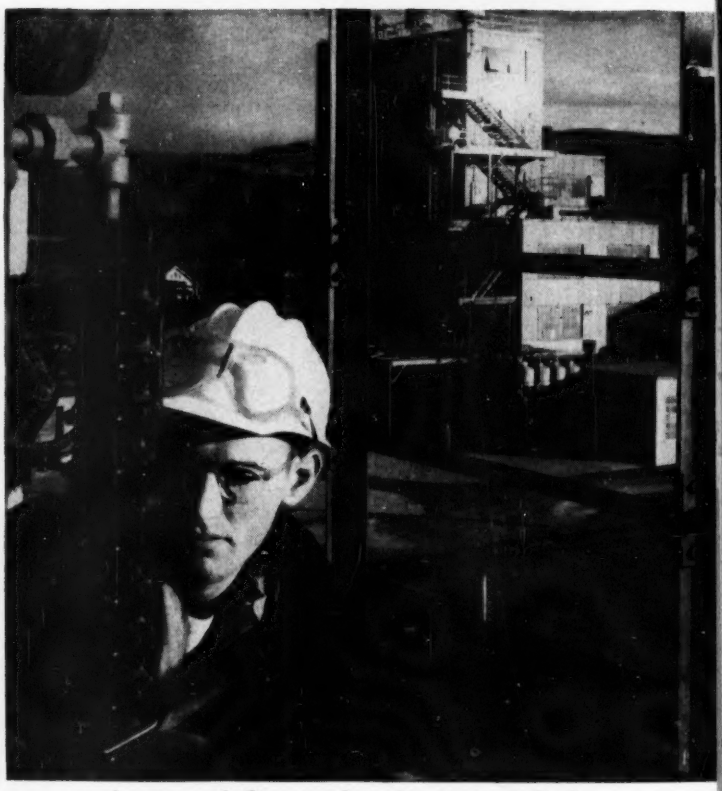
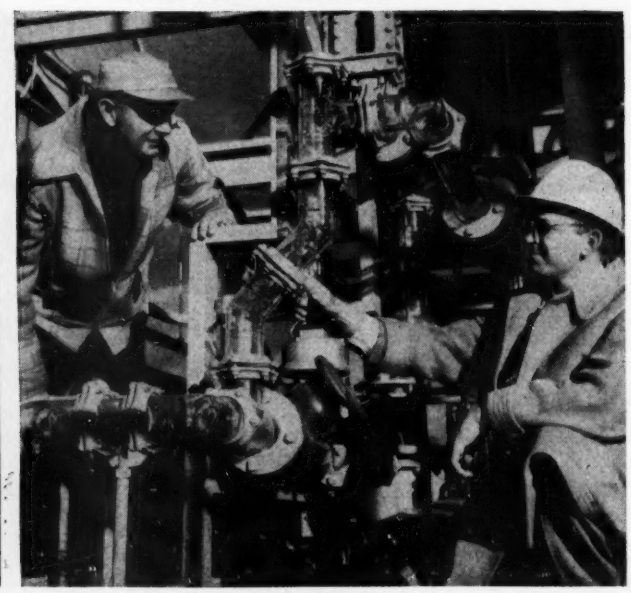
VOTATOR DIVISION: New York, Atlanta, Chicago, San Francisco



1 G.E. OFFICIALS *(left)* compare the new units with blueprint. James Donnalley, manufacturing manager, points out structures to James Castles, plant manager, and Charles Reed, general manager of silicone products department. D. D. Carswell of United Engineers and Constructors, contractor for job, looks on at right. Building *(right)* is hydrolysis unit.

A Doubleheader for Silicones . . .

(Story begins on page 42)



2 OPERATORS START UP a centrifuge in one step of the hydrolysis of the chlorosilanes.

3 SPLIT OUT FROM THE HYDROLYSIS is hydrochloric acid. Here a piece of the glass piping for handling it is inspected.

Make Your Own Tests

Of These **Baker**

METALLIC SOAPS

Studies made by our technicians suggest a wider range of usefulness, plus improved performance, for these ricinoleates compared with metallic stearates.

They are applicable in a very wide field. A trial run in any of the categories listed below should develop worthwhile production advantages.

Barium
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Cadmium
Ricinoleate

Calcium
Ricinoleate

Magnesium
Ricinoleate

Zinc
Ricinoleate

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120 Broadway, New York 5, N. Y.

Please send samples of the following Ricinoleates:

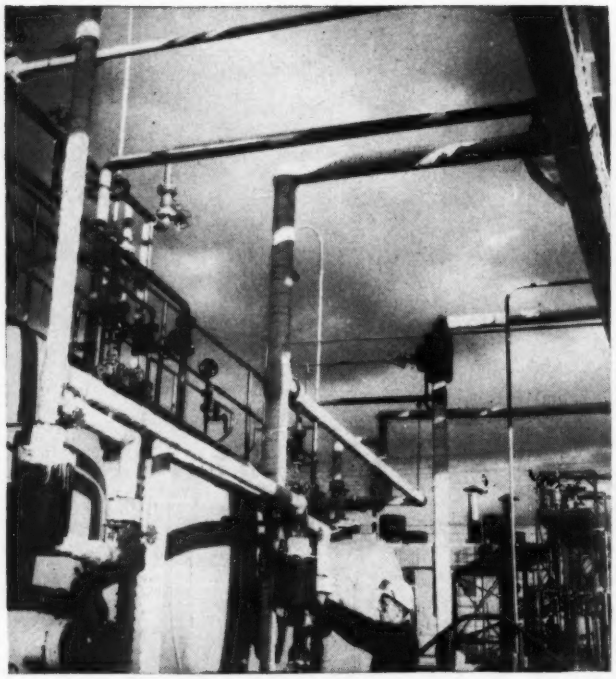
Barium ☐ **Cadmium** ☐ **Zinc** ☐
Calcium ☐ **Magnesium** ☐

Name_____

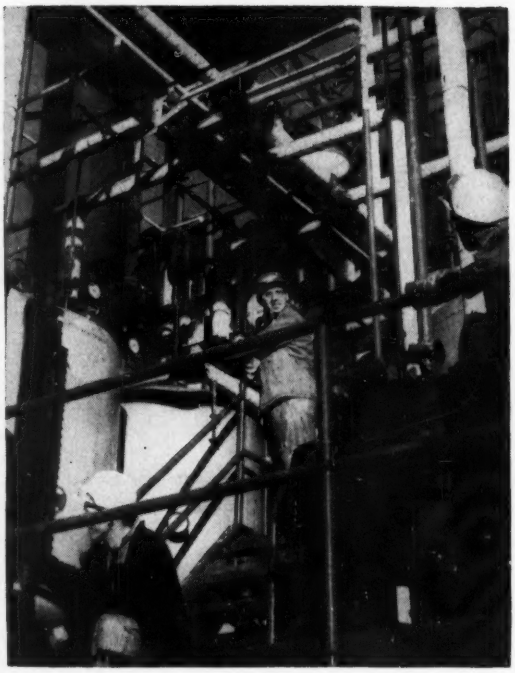
Title_____

Firm_____

Address_____



4 METHYL CHLORIDE ARRIVES in tank cars, is stored in these tanks. It's reacted with silicon to form the crude chlorosilanes.



5 INTERMEDIATES FOR THE PRODUCTION of gum for rubber are made in this unit.

PRODUCTION . . . . . .

. . . More Plant, New Product

Two more advances are being chalked up for silicones by General Electric this week. For as it is putting the finishing touches on a $5 million expansion of its Waterford (N.Y.) silicone plant, it is also introducing a new silicone rubber. The completed expansion, says G.E., gives it a production capacity "comparable to any in the country." The new rubber, it adds, is designed to stand up under temperatures as low as —120 F.* Slated for such uses as wire insulation on ignition systems for arctic ground equipment, the low-temperature rubber is another new twist for the firm whose original interest in silicones (in the late '30's) stemmed from their potential as high-temperature electric insulation.

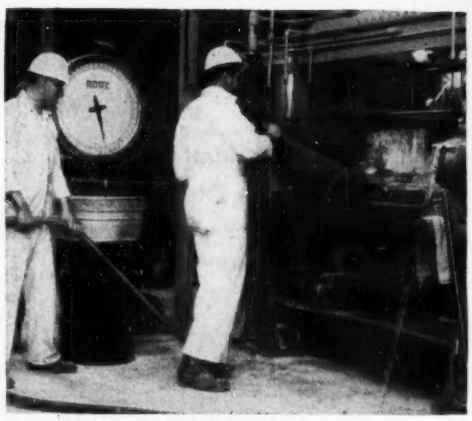
For its expanded output, G.E. is stringing along with its direct process. Actually, all the processes for making silicones depend on the same three steps: formation of chlorosilane intermediates, hydrolysis and polymerization by condensation. Differences among the various methods lie in the approach to the formation of the chlorosilanes.

Dow Corning, for instance, the other major silicone producer, chose the Grignard reaction for the first commercial production of silicones. But though it is still operating a large unit for the production of silicones via the Grignard, it has indicated a switch (*CW, Nov. 7, '51*) to the direct method.

In the Grignard process, silicon tetrachloride reacts with an alkyl (or aryl) Grignard to form the corresponding chlorosilane and magnesium chloride. The direct process, on the other hand, involves the reaction of a hydrocarbon halide with silicon in the presence of a catalyst—copper for alkyl silanes, silver for aryl silanes.

Although G.E. has never revealed the refinements of its silicone processing, the patents and published works of its researchers indicates the operation takes place along these lines. In making methyl silicones, for example, methyl chloride arrives at Waterford in tank cars, is stored in large tanks. Lumps of silicon are ground to a fine powder in a conical ball mill and mixed with about 10% by weight of copper. The catalyst-silicon mixture is introduced at the top of the reactor and forced down while the methyl chloride is fed to the bottom and rises.

Crude chlorosilanes and the unreacted methyl chloride are cooled, and separated into a chlorosilane-rich frac-



6 THE SILICONE RUBBER is compounded in these mills.

7 OPERATOR INSPECTS contents of a new kettle for making silicone oil.

* Although it will be G.E.'s first silicone rubber capable of performing at those temperatures, it won't be the only one on the market. But G.E. figures its new rubber has some clear-cut advantages over competitive ones.

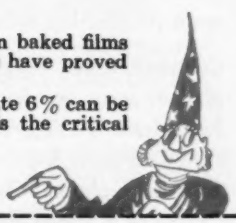
RARE EARTHS

Hexogen Rare Earth Octoate 6%
Soligen Rare Earth Napthenate 4%

Especially designed for use as drier catalysts in baked finishes, giving results unobtainable with the conventional drying metals generally used.

The Observed Advantages are:

a) Increased cross linking in molecular structure resulting in markedly tougher films.
b) Wide range of activity at normal baking temperatures and cycles
c) Excellent color retention in baked films
d) Increased film hardness and toughness
e) Savings in cost by reducing amino resin additions
f) Improved water and soap resistance of film
g) Marked drying efficiency in baked films where other metallic driers have proved inefficient
h) Hexogen Rare Earth Octoate 6% can be used where discoloration is the critical factor in the baked film.



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For further information and samples, without cost or obligation, just fill out and mail coupon.

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RE 531-CW

Resin Manufacturers...

Produce more with your present equipment!

use Celanese*

PARAFORMALDEHYDE

- 30% larger batches—paraformaldehyde eliminates water bulk.
- ⅓ shorter cycle time—reflux and dehydration steps can be cut by hours.
- greater yields—lower formaldehyde-to-phenol ratio (using paraformaldehyde) produces higher resin yields.
- new low price makes Celanese Paraformaldehyde competitive with formalin. New production units assure large volume supply.

Ask your Celanese representative to show you how you can shorten processing time, cut material, equipment and labor costs, and increase resin production with your present equipment.

Celanese Resin Application Laboratory will be glad to assist you in making up and testing trial formulations using Celanese Paraformaldehyde as a replacement for formalin. Write for complete data in Technical Bulletin N-30, to:
Celanese Corporation of America, Chemical Division, Dept. 652-A, 180 Madison Avenue, New York 16, N. Y.

COST AND PRODUCTION COMPARISON†

(for a hard, grindable synthetic phenolic resin)

Typical Fee operation	Case 1 Formalin	Case 2 Paraformaldehyde
No. of 1000 gal. kettles	1	1
Days per week	6	6
Shifts per day	3	3
Batches per day	2	3
Time/batch hrs.	12	8
Weekly costs $	12,480	22,464
Weekly Prod. lbs./per kettle	48,000	93,600
Unit Cost ¢/lb. of resin	26.0	24.15

†In manufacture of oil soluble substituted phenolic resins, the savings can be even greater.

IF YOU PLAN ADDITIONAL INSTALLATION, you can materially reduce your capital investment by using Celanese Paraformaldehyde. No need for heated storage tanks; same output from smaller kettles; less storage space. Lower steam, electricity and cooling water costs.

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

tion and a methyl chloride-rich fraction which are fractionated. The methyl chloride can then be recycled.

In general the desired chlorsilane product is the dichlorodimethylsilane since it is bifunctional, can be used to build up a long silicone chain. However, methyltrichlorosilane—being trifunctional—is useful for cross-linking and trimethylchlorosilane with only one functional group is necessary for chain-blocking. Both compounds, along with several others, are formed in the reaction.

Likely to Succeed: There are several alternate routes for making silicone polymers that stack up as attractive commercial processes. But right now the Grignard and direct methods are the most significant commercial ones.

Each has some decided factors in its favor. Thus, while the direct process requires fewer steps, the Grignard is the most flexible. By the same token each has some definite drawbacks, for while the Grignard involves many steps, depends on raw materials that carry a low percentage of silicon, the direct method is not suitable for making large quantities of the cross-linking trihalosilanes.

EQUIPMENT. . . .

Metering Pumps: Central Scientific Co. (Chicago) reports a new line of Maisch metering pumps with capacities up to 3.6 gpm. Said to resist corrosion and prevent contamination of the liquid being handled, the new pumps are recommended for moving viscous and non-viscous liquids. One outlet the firm is hoping to crash is transferring sterile fluids in the pharmaceutical field.

•

Smaller Starter: Recently developed by the Arrow-Hart & Hegeman Electric Co. (Hartford, Conn.) is the "RA-V" Magnetic Motor Starter. Designed for use with explosion-proof conduit, the starter features reduced size and weight.

•

Venturi Valves: Now being marketed by the Crane Co. (Chicago) is a new line of valves. Using a ball instead of a conventionally shaped disc, these new valves are said to provide accurate flow control with a minimum of wire-drawing, easy operation, freedom from vibration and chattering, absolutely tight shut-off, and a straight-through flow with much lower pressure drop than that through a globe valve.

•

Non-Slip Grip: Soon to be standardized for its complete line of valves is the Lunkenheimer Co.'s newly patented "Non-Slip" handwheel. Featuring four finger-spaced lugs projecting beyond the octagonal frame, the handwheel permits the operator to get a firm grip in spite of wet or greasy hands.

•

Dustless Discharge: The Stephens-Adamson Mfg. Co. (Aurora, Ill.) has just come out with a new adaptation of its Zipper Belt Conveyor, the S-A Bunker Seal. Designed to prevent dust at discharge spouts, the Seal is simply a zippered, rubber cover for storage bunkers. A traveling spout unzips the cover before discharge, then re-zips it as it moves from bunker to bunker.

•

Automation: Harry C. Davis, president of the Conveyor Equipment Mfg. Assoc. (Washington, D.C.), feels that 1953 will see conveyor systems providing a major market for automatic control devices.

•

Submarine Servicing: Cutting servicing time on submerged machinery from several days to one afternoon is claimed for Innertol Co.'s (Newark, N.J.) new grease coating. Underwater steel is reported to require no surface preparation for this grease application.

•

Plastic Pipe: Newly available from the American Agile Corp. (Bedford, Ohio) is a wide range of Agiline "CP" polyethylene pipe and tubing.

•

Gas Analysis: The Burrell Corp. (Pittsburgh) has just introduced several new reagents for gas analysts. Offered are: Sorbent A for absorption of total olefins, ethene, propene, butene, and pentene; Sorbent B for selective absorption of iso-butene; Sorbent C for propene, butene, and pentene; Sorbent D for acetylene series; and Disorbent for carbon monoxide.

•

"Z" Calender: Latest and largest addition to Farrel-Birmingham's (Ansonia, Conn.) line of precision calendering machines is the new "Z" model. Equipped with four 36" x 92" rolls, the machine is part of a complete train used in the manufacture of thin vinyl plastic.

•

Comparison Spectrometer: Now being marketed by National Instrument Co. (Baltimore) is the Spectron Comparison Spectrometer for the qualitative analysis of metals. Attachments furnished with the instrument adapt it for use as a visual colorimeter for testing the absorption spectra of liquids.

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RM RESISTANT MATERIALS
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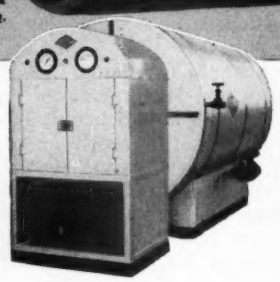
RED DIAMOND CO_2

one cylinder

or TEN TONS

Liquiflow CO_2 SYSTEM



"Liquiflow" receiver in customer's plant is charged with low pressure liquid carbon dioxide from "Liquiflow" tank truck.

Whether your CO_2 requirements are one cylinder, or more than 10 tons, "Liquid" can supply it wherever you are. One of its many distribution points is near you—ready to deliver, when you want it, as you want it. In 50 lb. cylinders or by "Liquiflow" tank truck to specially designed "receivers" in your plant. It is also available in solid form as dry ice, in whatever quantity you require.

A Liquid field engineer is available to assist you in your plans or in solving your problems in any CO_2 application. A request to any of our branch offices or to our headquarters in Chicago will bring a prompt reply.

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THE LIQUID CARBONIC CORPORATION
3100 South Kedzie Avenue, Chicago 23, Illinois
WORLD'S LARGEST PRODUCER OF CO_2

PRODUCTION . . . . .

Boom Year: According to W. J. Donald and A. J. Nesti of the National Electrical Manufacturers Assoc. (New York), total production volume in 1953 may pass the all-time peaks of 1951 and 1952 by 10%. This would mean a total volume of production for the electrical manufacturing industry of $13.2 billion this year.

•

Electric Valve: Now available is a bulletin by the Atkomatic Valve Co. (Indianapolis) giving a run-down on its Solenoid Electric Valves for high pressure lines.

•

Sealed Idler: The Industrial Division of the Continental Gin Co. (Birmingham, Ala.) has just marketed a new Timken Bearing Belt Conveyor Idler which is prelubricated and sealed. Type "UST" Idler is designed to operate for extended periods without relubrication.

•

Talented Turntable: Recently developed by the Gale Dorothea Mechanisms (Elmhurst, L.I.) is the new "Flexi-Turn." The turntable is reversible, variable in speed from 0 to 20 RPM, can be remotely controlled, and features a "dialed in" velocity control.

Markets in Wastes

Pressure is being put on the Navy for a trial use of fly ash in concrete mixes. Deputy Highways Engineer W. L. Chilcote of the Baltimore Bureau of Highways is advocating an admixture of this fine ash with Portland cement for road reinforcement. Chilcote (a commander in the USNR) urges that this would make chemical and power plants happy finding a by-product market while losing a disposal problem. And at the same time, large savings would accrue to the users because of the price differential.

Mixed with Portland cement, fly ash slowly combines with the free lime released as the cement hardens. Together with certain adhesive properties of the ash, this reportedly results in dense, stronger concrete. Substitution of one bag of ash for one bag of concrete per cubic yard of a highway test section (Baltimore, 1950) showed the combination to be 1/5 stronger than the conventional concrete.

Long urged but seldom realized, the combination of cement and fly ash has been specified for Baltimore's new Liberty Dam. Should it make the transition from the vertical to the horizontal, it would provide a clean air incentive, as Chilcote says, for many chemical plants.

"Take a letter to the J. T. Baker Chemical Company...

...We need TONNAGE CHEMICALS of controlled purity."

"Dear Sirs:

"We are in the market for several metallic salts where specific impurities must be held to exacting tolerances.

"Your salesman, when he last called, advised that you frequently were in a position to supply these chemicals from stock—or could make them to specification if requirements were sufficient for economic manufacture.

"We would like to make arrangements for a meeting here with our technical staff—to go over our needs, arrange for pilot run quantities, and determine prices and schedule of deliveries on a tonnage basis.

"Please phone when your company representative can see us."

This letter is typical. Wherever there is a need for tonnage chemicals to exacting standards, purchasing managers know it pays to "ask the Baker salesman."

Baker is particularly qualified to serve your needs. Today, with newly expanded production facilities—with a half century of experience and "know-how," the J. T. Baker Chemical Co. is headquarters for tonnage chemicals of high purity.

When chemical problems arise, rely on Baker. Write, phone, or ask the Baker salesman when he comes in. We'll try and help.

J. T. Baker Chemical Co.
Executive Offices and Plant, Phillipsburg, N. J.

Baker CHEMICAL

Baker Chemicals

REAGENT • FINE • INDUSTRIAL

RESEARCH DIRECTOR Vic Renner checks results obtained from vermiculite-carried herbicide in O. M. Scott and Sons' test greenhouse. This prompts . . .

PHONE CALL to Zonolite Co. sales office for more vermiculite research data.

Sales Aid: A "Central Intelligence Service"

Research data is never worthless, but sometimes it gets lost or forgotten. That's especially deplorable to technical service men, because customers' inquiries and problems tend to duplicate themselves repeatedly. But one way to circumvent the danger is to institute an "information center" of the type that Zonolite Co. has established at its Evanston, Ill., laboratories. Here, in one exhaustive file, lies all available data on vermiculite research—including work done by Zonolite, its customers, and others.

The information in this file has

AVAILABLE INFORMATION on product is condensed and indexed on punch cards. Three of these are related to the inquiry and the corresponding data is rushed to . . .

RENNER from Zonolite's "information center," aiding his further experiments.

Here's a **LOW COST** *answer*

to many ***BASIC RAW MATERIALS*** *problems...*

Piccopale

A 100% Polymerized Petroleum Resin

COMPLETELY NEW!

ENTIRELY DIFFERENT!

READILY AVAILABLE AT LOW COST!

BY THE TRAINLOAD IF YOU WANT IT!

PICCOPALE is a completely new synthetic resin, offering many money-saving and product-improving advantages. It is chemically inert—not affected by acids and alkalies; it is moisture-proof; its initial color is good and stability is fair; it is compatible with a very wide range of products, including waxes, rubbers, polyethylene, coumarone-indene resins, phenolics, rosins and esterfied rosins, many alkyds and vinyls, and most drying oils. PICCOPALE is soluble in naphthas, chlorinated solvents and long-chain oxygenated solvents.

PICCOPALE is available in enormous quantities—by the trainload if you want it—and priced so low that it can be used as a basic raw material.

Distributed by Pennsylvania Falk Chemical Co., Pittsburgh 30, Pa. and Harwick Standard Chemical Co., Akron 5, Ohio

PICCO

PENNSYLVANIA
INDUSTRIAL CHEMICAL CORP.

Clairton, Pennsylvania

Plants at Clairton, Pa.; West Elizabeth, Pa.; and Chester, Pa.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PENNSYLVANIA

Please send sample of PICCOPALE for (*application*)

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(*check*) **solid** ☐ **flaked** ☐ **liquid solution** ☐

Name _____

Company _____

Address _____

(PW)

To a chem-man puzzled about fatty alcohols:

Fatty alcohols have come a long way since their introduction over twenty years ago. Then, few chemists knew how to best utilize the unique combination of properties these raw materials possess. Today, CACHALOT brand cetyl, oleyl, and stearyl alcohols are used as intermediates in many varieties of chemical processing. Their wide range of reaction possibilities includes not only sulfation, sulfonation, and condensation, but also conversion to aldehydes, brominates, esters, mercaptans, nitrites, and phosphates. Users prefer CACHALOT because they can choose the exact types they need from this largest line of alcohols commercially available in tonnage lots of controlled purity. To find out how you can profitably use fatty alcohols, write M. Michel and Company, Inc., at 90 Broad Street, New York 4, N. Y. For more than a quarter century basic suppliers to chemical manufacturers, their name for the finest fatty alcohols is

Cachalot®

PROTECT Your Workers from DUSTS

with

DUPOR No. 4 Respirator

$2.00 each

★ Perfect protection against nuisance dusts and fumes. Soft rubber face mask gives air-tight fit — double filters provide easy breathing. Sanitary face cloth protects against dermatitis or chafing. No stale air is re-breathed — patented exhalation valve guard prevents this. Weighs only 4 oz.

Let us send full particulars on this and other DUPOR Safety Equipment.

H. S. COVER
STA. "A", SOUTH BEND, IND.

been, in turn, summarized onto a ten-inch stack of punch cards, duplicates of which have been forwarded to each of Zonolite's branch sales offices. Using the ice-pick method, the company's sales force can rapidly tell a customer whether or not research has been done on his particular problem. If it has, the requested data can be forwarded promptly from Evanston. On the other hand, if no information is available, the customer's researchers at least have the satisfaction of knowing that they are not duplicating work already done by other vermiculite researchers elsewhere.

ARMOUR TRAINEES: Fundamentals come before details.

Seven Days to Sales

The Armour Laboratories is the newest arrival in the ranks of pharmaceutical manufacturers which have bet on concentrated training programs as the best way to build drug sales.

The promotion of pharmaceutical products calls for a specialized, delicate kind of selling—but as more and more "wonder drugs" come to market, it's inevitable that conditions will become increasingly competitive. That poses a problem: How do you keep a kid-gloved approach while mounting an aggressive sales effort? The answer seems to lie in the careful training of the detail men who carry the company's message to the nation's doctors and druggists.

In Armour's case, this is done through the medium of a seven-day "cram course" at the company's Chicago home offices. Through all of this year, in groups of fifteen, the detailers will learn both the "hows" and the "whys" of drug salesmanship. Newer men will come first, followed by the older veterans. When the whole 250-man team has finished the course, an "advanced" session will start.

Humility Helps: Under the guidance of Ernest Coons (*left, above*), director of sales training, the detailers are exposed to coordinated talks by Armour's fifteen staff doctors, who give the medical side of the company's products, and the individual product sales managers, who explain how they can best be promoted.

Larded into both sets of lectures are statements that clearly define the selling framework within which the detail men must operate. Items:

- "We cannot and do not wish to give you so much information that you'll consider yourself more of an authority than the doctor. Your stature will rise in his estimation if you show that you have a good understanding of fundamentals and refrain from speaking of minute details."
- "Humility can be important not only to a scientist, but also to a salesman. There are some detail men—prone to continual bluffing—who would disagree with that. Our purpose is to give you enough background knowledge so that you will never be tempted to bluff."

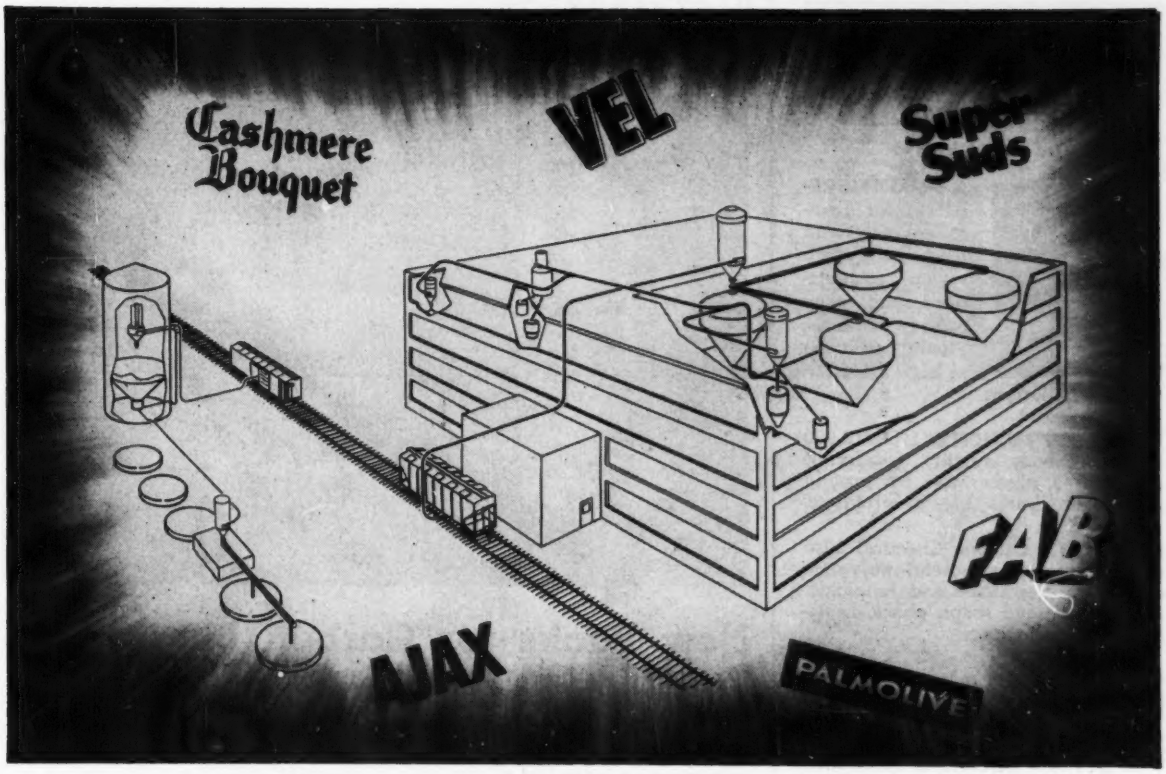


Diagram of Dracco system at Colgate's Jeffersonville plant where the "Airstream" Conveying technique has been used over 15 years. Main "in-plant" system unloads to storage (at 12½ tons/hour), withdraws from storage and transfers to production (at 5 tons/hour).

MASS HANDLING *Cleanliness* AT COLGATE

At their Jeffersonville (Indiana) soap and detergent plant, the Colgate-Palmolive-Peet Company utilizes Dracco "Airstream" Conveyors extensively to simplify bulk materials handling.

Soda ash, tetra-sodium pyrophosphate and other chemicals are unloaded to storage from railroad cars by the "Airstream" system. The same system also transfers materials from storage to process equipment, thereby eliminating many manual operations and improving production economy.

Throughout the plant the Dracco materials handling equipment has been designed to integrate smoothly with Colgate's manufacturing operations. The three Dracco Receivers in the distribution system were strategically placed over the three separate production areas to discharge materials to mixing tanks by gravity. Placement of the Dracco equipment on the roof permits full utilization of all production space.

The handling flexibility and savings produced at Colgate are typical of Dracco installations throughout the process industries.

Write Dept. W-1, Cleveland 5, Ohio for the Dracco Airstream Conveyor Bulletin 529.

DRACCO CORPORATION

Harvard Ave. and East 116th St. • Cleveland 5, Ohio

DRACCO *Performance Proved*

Airstream CONVEYORS • DUST CONTROL EQUIPMENT

Ottafect

A Fungicide, Germicide and Preservative

A PLUS INGREDIENT for disinfectant solutions, pine oil and scrub soap formulations, and many other products. Phenol coefficient as high as 244 in some formulations.

WITH LOW TOXICITY (L.D.o 28,000 mg/kg of body weight), Ottafect is useful as a preservative for protein and carbohydrates. Easy to formulate.

OTTASEPT. Ottawa Chemical also offers Ottasept, a potent, non-toxic companion germicide and fungicide. For use in hand soaps, pharmaceuticals, and cosmetics.

SAMPLES. Write today for samples and data sheets for each.

***The* OTTAWA CHEMICAL COMPANY**
817 Hamilton Str., Toledo 7, Ohio

CHEMICAL BARGE LINES
INC.

222 W. EIGHTH ST.
WILMINGTON 1, DEL.

TRANSPORTATION OF BULK COMMODITIES

CHEMICALS, COAL, PETROLEUM, SULPHUR, ETC. ON THE MISSISSIPPI RIVER SYSTEM and GULF INTRACOASTAL WATERWAY

AFFILIATED WITH
LEA RIVER LINES, INC.
INDIAN RIVER LINES, INC.

New Packs for Carbon Blacks

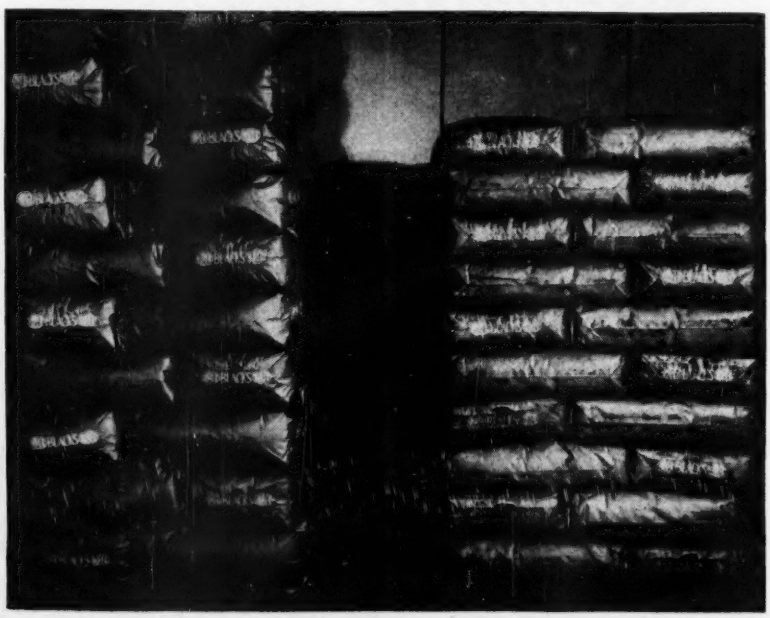
EASIER TO HANDLE, less wasted space—those are the aims of two new carbon-black packages now in use.

One of these, a fiberboard carton supporting an inner bag of compressed black (*above*),* is the joint development of Firestone Tire & Rubber and the Witco Chemical Co. Firestone plans to use the package extensively in its shipments to subsidiaries overseas. Present equipment limits the size to 25-pound packs, but new machinery on order will permit the packing of standard 50-pound units.

Besides being simpler to handle and store, an additional advantage is claimed for the rectangular package: Because the black is in a compressed briquette, it does not flow out of accidental punctures during shipment.

Less of a departure from normal—yet allowing a 12% savings in storage space—is a new valve-type bag being used by the J. M. Huber Corp. for its packaging of channel blacks. Two 2,500-pound shipments (*below*)—one using the new bag and the other packed in the former style—demonstrate the space savings to be realized. Development work is in progress on a similar package for furnace blacks.

* Gathered around a trial shipment bound for Port Elizabeth, South Africa, are (*l. to r.*) F. J. Reighly and A. T. Marubbio (of Firestone Tire & Rubber) and Witco's A. R. Swenson.



DOUBLE CHECKED ✓ FROM RESEARCH TO INDUSTRY

SHARPLES TRIETHYLAMINE

This Unusual Feature

Triethylamine can be easily recovered from aqueous solutions because it is:

- ✓ Soluble in all proportions with *water* below 18°C.
- ✓ Above 18°C. forms two layers:

Temperature Degrees C	Concentration Triethylamine in Lower Layer	in Upper Layer
20	15.5%	73%
25	7.3	95.5
30	5.6	96
50	2.9	—
70	1.6	—

These Properties...

- ✓ Strongly basic

  Dissociation Constant @ 25°C. 6.4×10^{-4}

  pH at 25°C.

0.1N	11.8
0.05N	11.7
0.01N	11.3
0.001N	10.3

- ✓ Azeotropic mixture with water; B.P., 75°C.; 10% water and 90% triethylamine
- ✓ Low Combining Weight 101.19 (Calc'd)
- ✓ Boiling Range—85-91°C.

Have resulted in these Actual and Suggested Applications

- ✓ Isolation and purification of antibiotics
- ✓ Catalyst for phenolic resins
- ✓ Viscosity controller in enamels
- ✓ Acid accepting catalyst and solvent
- ✓ Intermediate for triethylammonium phosphate

SHARPLES TRADE ✓ MARK CHEMICALS

Other Sharples Tertiary Amines

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Diethylaminoethanol
Dimethylaminoethanol
Dibutylaminoethanol

Sharples also produces monoalkyl- and dialkylamines.

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Middle-Man Redefined

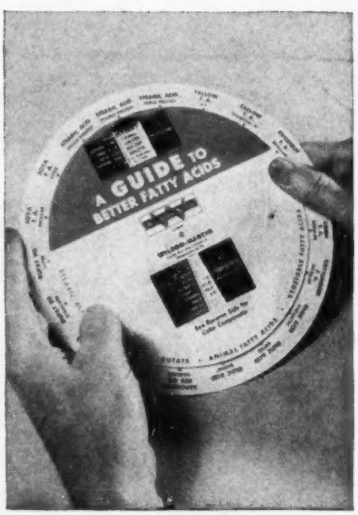
"Uniform standards" is the aim of a new directive issued by the General Services Administration revising previous regulations on the propriety of relationships between sales agents and their clients who sell to the government.

"We are again attempting to slam the door only on the influence peddler and the seeker of exorbitant fees," says GSA. But under the former rules, established in 1950, it was sometimes difficult for contracting officers to distinguish between legitimate agents and the "five-percenters."

The new regulation takes out the guess-work. It provides, for instance, information on comparative charges paid in commercial practice and recognizes that "a concern, especially a small-business concern, may employ an individual who represents other concerns . . ."

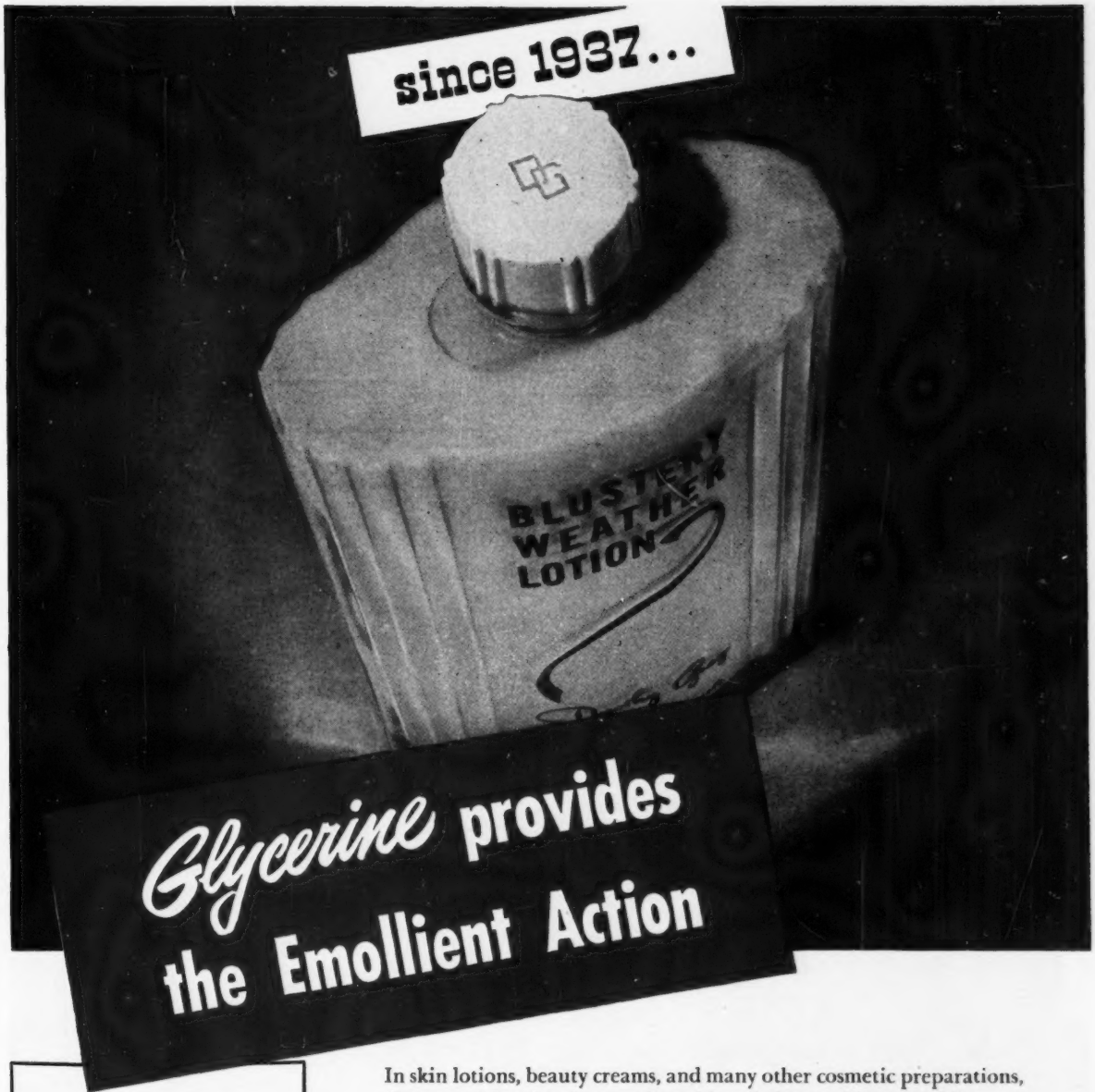
Moreover, the directive recognizes that the contracting officer should consider services of the agent other than actual solicitation (*e.g.*, technical assistance, etc.).

Industrial middle-men – who have been sometimes subjected to an overly suspicious scrutiny – are welcoming the change.



Data: In the Round

PHILADELPHIA's Wilson-Martin division of meatpacking Wilson & Co. is rightfully proud of its new eight-inch "slide-chart" data guide for fatty acids. A natural outgrowth of a smaller one introduced three years ago, the new circular device now includes a percentage-composition section and a "color conversion chart" (on the reverse side). Nineteen Wilson-Martin products are covered.



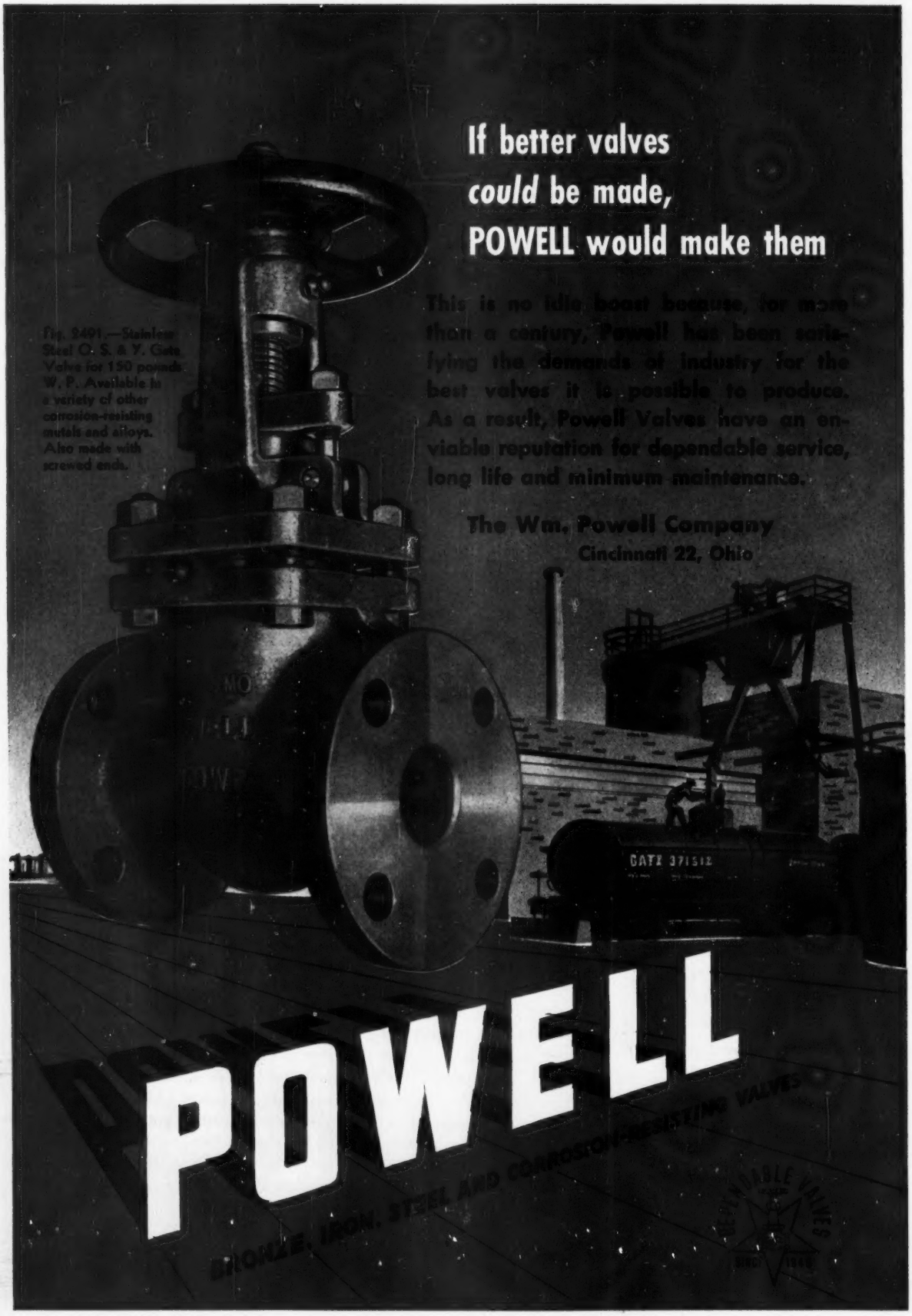
Ever since its introduction in 1937, Dorothy Gray's "Blustery Weather Lotion" has been a great favorite with women who want to keep their skin lovely. U. S. P. Glycerine is one of the ingredients providing the emollient action; it also acts as a moisture-retainer in this popular protective lotion for chapped hands, scratchy legs, and dry skin.

In skin lotions, beauty creams, and many other cosmetic preparations, the essential action is one of soothing and smoothing the skin. Dorothy Gray and many other leading manufacturers of cosmetics and toiletries choose Glycerine because it not only provides this important emollient action but can perform as a humectant as well.

Even more important, U. S. P. Glycerine permits the formulation of products which are physiologically safe. Glycerine has many other properties which emphasize its value in other toilet articles. It acts as a plasticizer, vehicle, bodying agent, solvent, penetrant, or anti-freeze. That's why no substitute has been found which brings all of Glycerine's qualities to the production of toilet goods.

A handy, 16-page booklet, "Why Glycerine for Drugs and Cosmetics?" reviews Glycerine's unique range of properties and applications. For your copy write Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

Nothing takes the place of Glycerine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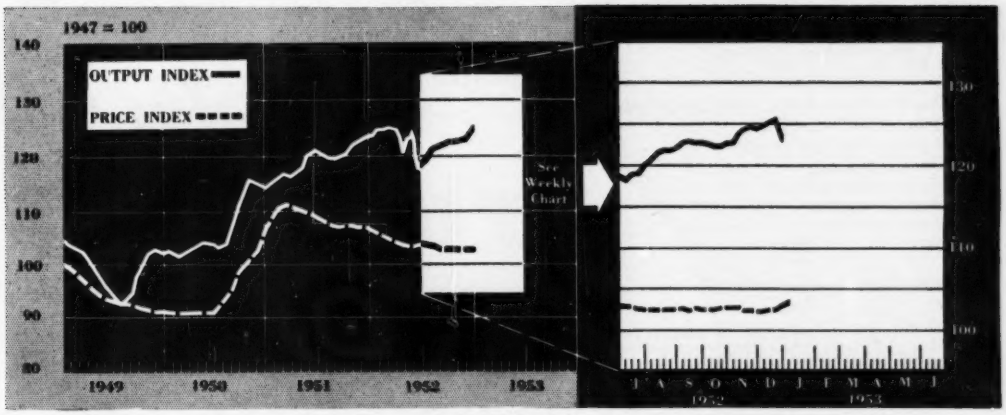
MARKETS . . . . . .



CW Index of Chemical Output—Basis: Total Man Hours Worked in Selected Chemical Industries
CW Price Index—Basis: Weekly Prices of Sixteen Selected Chemicals

MARKET LETTER

More glycerine, long predicted, may soon become a reality. There should be an easing of the pinch in six weeks. And a steady market through 1953 is a good bet.

Three factors contributing to relief are:

(1) Shell Chemical's production, slow to pick up from last year's strike, is now approaching full steam.

(2) Cosmetic high-demand season has passed.

(3) Several foreign shipments (including an especially large one) are due shortly.

Chlorine, contrary to some reports, will stay in balance for at least several months. But later in year stepped-up demand may tighten supply. Cause: Newly developing outlets are expected to take hold after summer.

Enough urea—It's a long way off. Japanese shipments may help the Pacific Coast users but they'll never fill the Eastern need; freight's too high.

English urea, reported steadily arriving, still leaves much to be desired (in amount). East Coast users, say producers, will be limping along until well into 1954.

Ammonia production is still running a couple steps behind the farmers. Direct application methods in agriculture have taken hold faster than facilities. U.S. Department of Agriculture predicts this use alone will rise from 171,000 tons this past year to a booming 250,000 tons in 1952-53.

Price-wise, there's still a split in the ammonia market. Whereas most makers upped their tags (as of January 1) from $80 to $82 per ton, one producer held the line at $79, but he won't say how long he will continue at the lower level.

Another plant food, ammonium nitrate, shows no sign of easing either. All suppliers—if they say anything, declare "no relief." Right now, they claim, they are straining to meet present contracted obligations. And there's only an outside chance that next year will bring an improved situation.

MARKET LETTER

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	126.0	123.0	124.5
CHEMICAL WEEK Wholesale Price Index (1947=100)	103.1	103.2	105.4
Bituminous Coal Production (daily average, 1,000 tons)	1,530.0	1,304.0	1,839.0
Steel Ingot Production (1,000 tons)	2,240.0	2,213.0	2,083.0
Stock Price Index of 14 Chemical Companies (Standard & Poor's Corp.)	262.3	263.2	243.0

MONTHLY INDICATORS—PRODUCTION (Index 1947-49=100)	Latest Month	Preceding Month	Year Ago
All Manufacturing and Mining	233	229	219
Durable Manufactures	300	298	277
Non-durable Manufactures	197	195	188
All Chemical Products	307	303	299
Industrial Chemicals	588	576	563
Petroleum and Coal Products	288	279	276

The DDT stage is all set. Last week, shortly following the Du Pont price drop (CW Market Letter, January 10) Uncle Sam placed orders equal to about 3,300 tons (100% basis) roughly 10% of total for-sale production. Delivery schedule: by end of March.

With all factors now pointing to a price rise, several other makers are playing cagey, won't quote firm prices.

New process for impregnating leather with polyisobutylene may thwart some of the natural rubber producers marketing plans. Bureau of Standards claims:

(1) Easy penetration eliminates preliminary milling step needed for natural rubber.

(2) Tests on shoes show treatment halves water absorption, doubles abrasion resistance.

Victor Chemical's Silver Bow No. 2, phosphorus plant in Pacific Northwest, will probably go on-stream in March—if Nature cooperates. More water for power (CW, Nov. 1) is key need; a February thaw is what Victor hopes for.

Ammonium sulfate continues short or shorter, depending upon where you are. The Eastern shores got a bit of a break recently when the dock strike held up shipments going to Puerto Rico.

Result: Puerto Rico is now importing from the Continent, and that leaves us with that much more sulfate for home consumption.

Sulfur supply improvement "might be only of a temporary nature" is latest opinion of IMC, world sulfur regulatory body.

And a recent study made by sulfur specialist S. Schwartz says that optimistic sulfur stories don't jibe with national inventory figures. Since riding a high in September, inventory has slipped a bit, may continue to slide during the coming few months.

Don't count rayon and acetate textiles out, warns Clyde B. Morgan, Rayonier's prexy. Despite increased competition from newer fibers, he predicts a 13.6% world output hike by late next year.

Reason: Resurgence of rayon industry in Japan, Germany, Great Britain and France.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending January 12, 1953

UP

	Change	New Price		Change	New Price
Benzol, pure, nitration grade, t. c., gal. (one source)	$ .01	$ .3975	Molasses, blackstrap, feed grade, N. Y., gal.,	$ .005	$ .11

DOWN

	Change	New Price
Vitamin A, 1,000,000 units	.03	.12

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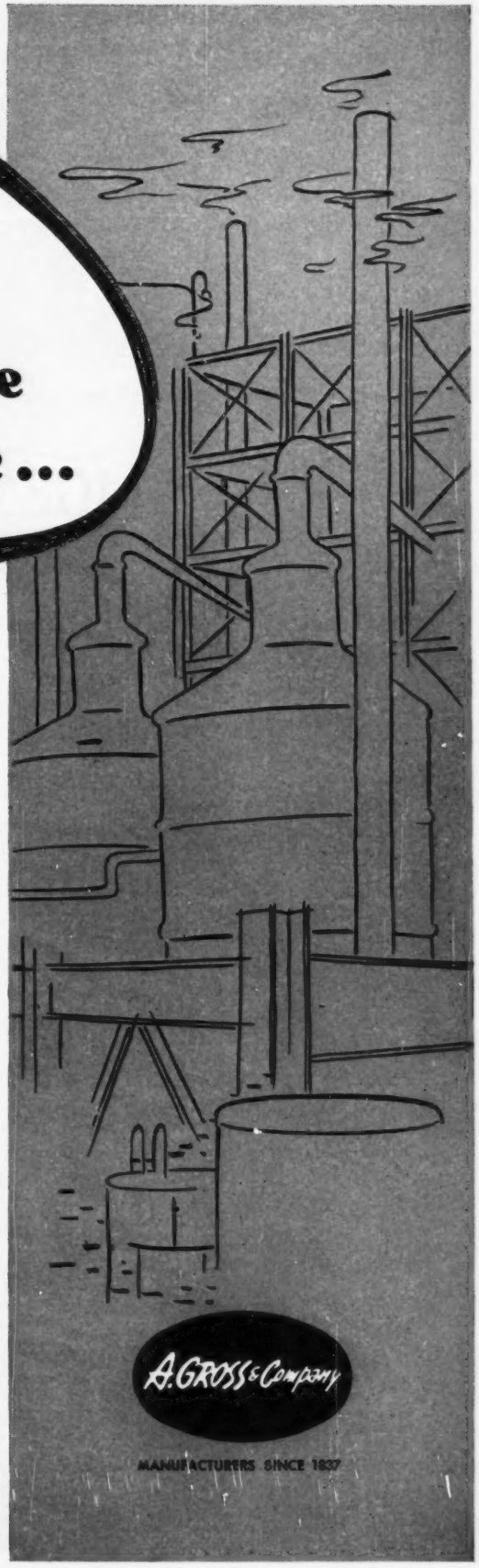

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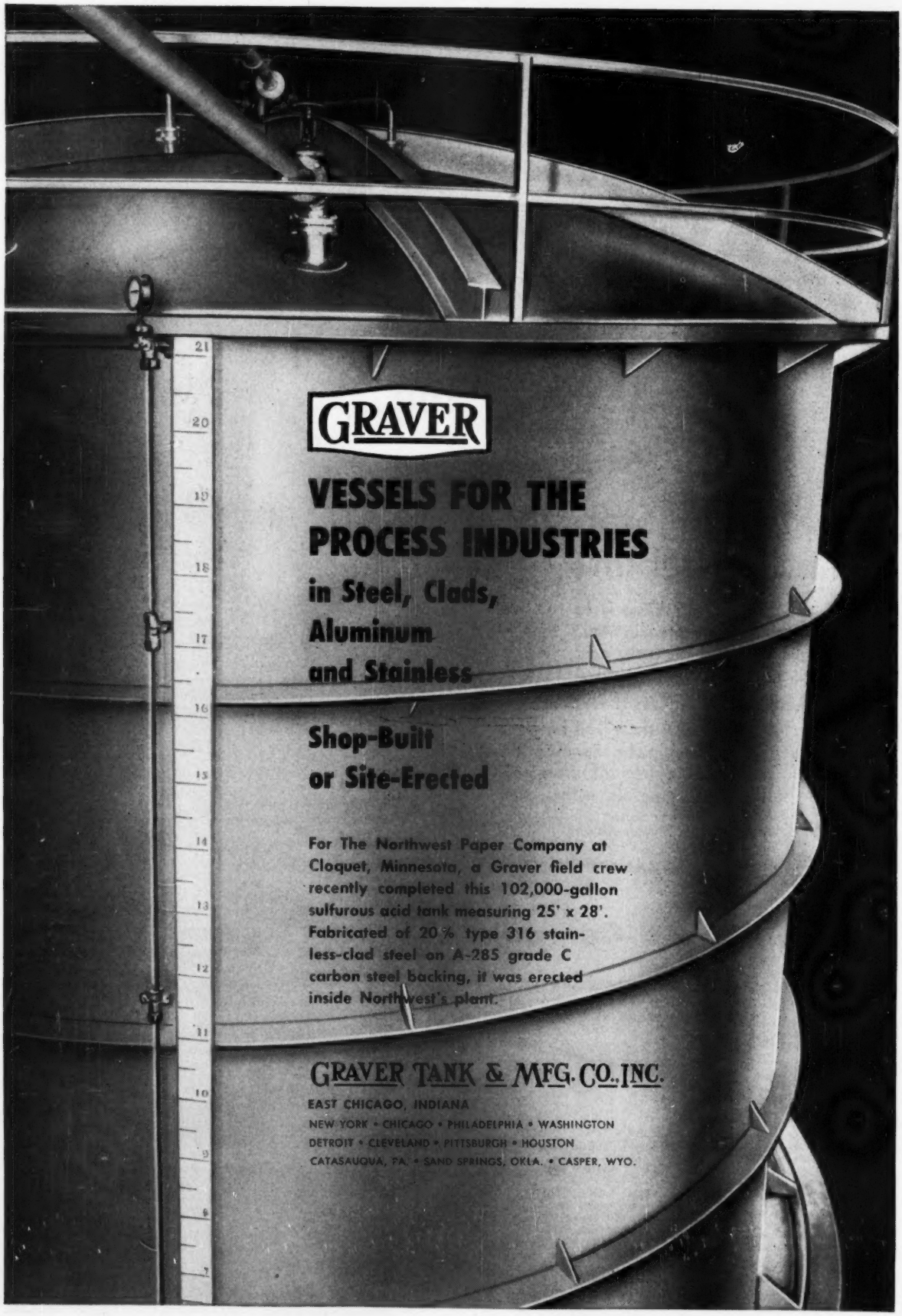
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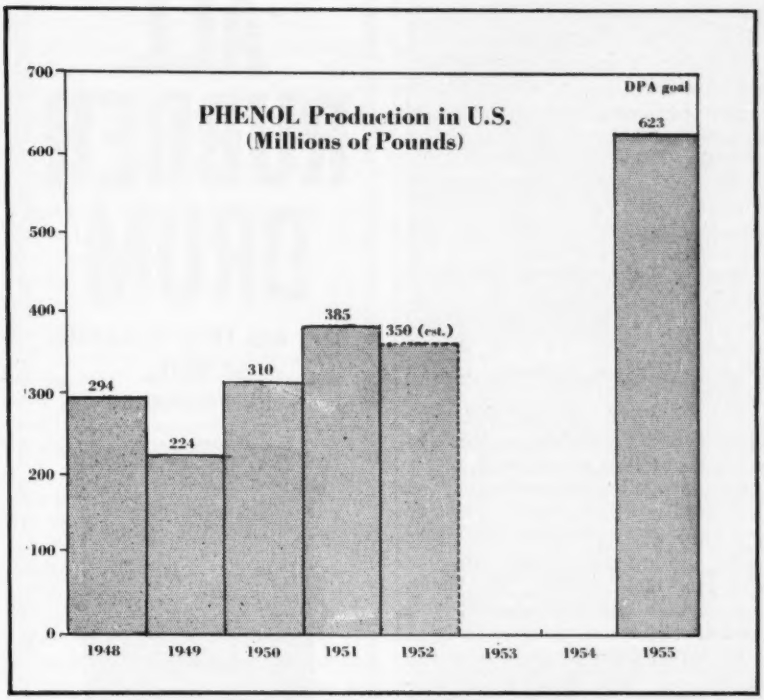

PHENOL: Coming events are casting a big shadow.

Phenol—Shot in the Arm

Latest development in shell molding may universalize method, spur phenol industry to rush expansions.

Metallic coating, waste wood recovery, other markets are expanding coincidentally, boosting potential consumption.

Result: 623-million pound 1955 DPA goal, formerly considered adequate, may well require upward revision.

Last week, a new development in a non-chemical industry fillipped a segment of the chemical producers. Shell molding, the bright hope of the phenol producers, apparently broke through the barrier of high costs, will now become available to the mass of the nation's 6,000 foundries.

Not new to industry (*CW, Aug. 23, '52*) application of shell molding for the rank-and-file depended partly upon the development of equipment that would be within the pocketbook of the average job foundry. Now, if the promises of molding machinery engineers are realized, phenol producers may find that even their present expansion plans will fall short of the demand created by the new technique.

For the past few years, phenol consumption, paced by the plastics industry, had slowed to an easy trot. What with political and economic interruptions, the original dash in phenolic plastics had lost momentum. From 1943 to 1946, phenol output had been suppressed at a 200-million pound level. Released after the war, pent-up demand shot to a temporary high in 1948 of nearly 300 million pounds.

By 1949, however, the phenol resins industry had expanded to a cross-section of the nation's economy. So when the general slump occurred that year, phenol consumption dropped for the first time since 1937.

With a subsequent rosier economic picture plus growing demands for 2,4-D, other weed-killers, fungicide and wood preservatives, phenol consumption pushed on to an all-time high in 1951 (*see graph*).

But for all that, no stirring impetus was shoving phenol at the accelerated rate of the early days of plastics. In fact, when the figures are all in,

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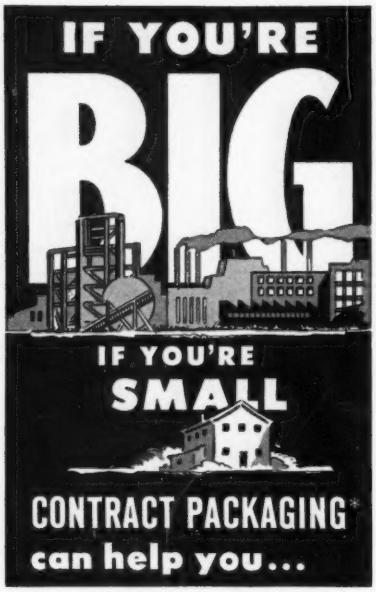

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MARKETS . . .

1952 consumption will be distinctly below the previous year.

Industry Telescope: Meanwhile, chemical firms, looking through long-range spyglasses, formed their own conceptions of the phenol consumption potential. During 1951, the National Production Authority, importuned to authorize building or expansion of phenol plants, finally gave the nod for additional construction.

Results of the agitation add up to this:

Capacity, Jan. 1951 — 343 million pounds.

DPA goal for Jan. 1955—623 million pounds

Recently, NPA reported that sufficient facilities had been assured to reach the 1955 expansion goal.

Of the total additional capacity, a present survey by CW shows:

- Only a small portion is now actually turning out phenol. This is, of course, not surprising, as a large part of the DPA authorizations did not take effect until quite recently.
- Two companies checked anticipated they would be in production by the third quarter of this year. Most of the others will probably not turn out phenol until 1954.

Too Late? If shell molding is progressing as rapidly as reported, it looks as if phenol consumption is due to rise in a hurry. An observer close to the picture looks for a sharp increase in demand. He foresees that "the lowering of molding costs will permit small foundries to switch over to plastic molds, rapidly quadruple phenolic requirements."

Just how fast this conversion to shell molding will occur is a subject of considerable difference of opinion. The equipment engineers, enthusiastic over their accomplishments, expect a rapid response to the cost-cutting method. Others, pointing out the necessity of educating molding staffs in the new art as well as selling management on the idea, predict a gradual change-over taking five, or even ten years.

Whether phenol will tighten up over the shorter term will depend, then, upon how fast the foundries are converted.

Too Little? Over the longer term, the question as to whether enough phenol will be forthcoming depends partly upon the goal set by DPA. Without shell molding and several other recent developments, the 623-million-pound mark, though suitable for partial mobilization objectives, might have appeared on the high side. With new civilian markets now opening, some sources consider the DPA

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goal could very well be raised.

Translating shell molding requirements into terms of phenol, one large maker estimates it at several hundred million pounds per year. Only a small percentage of this amount is now employed for shell molding (one estimate, 6 million pounds per year).

But shell molding, promising though it may be, is not the only new prospect for the phenol manufacturers. Several other rapidly expanding outlets figured to take sizable quantities:

- Rubber-phenolic compounds, replacing wood and metal in automotive parts, textile equipment, other applications, are expected to build up a market of perhaps 10% of total phenolic molding powder sales. In amount of phenol, this might translate to 15 million pounds.
- Waste wood binder, now taking less than 10 million pounds per year, is due for big rise, particularly in the light of continued high wood prices. Expert estimates vary as to size of eventual market, ranging from 35 to 75 million pounds annually three or four years hence.
- Another potentially huge market now nearer to realization is the metallic-coated phenol parts, such as for automobile grilles. Within the past year, at least one resin maker claimed to overcome the major hurdle to plating plastic—lack of conductivity. If the method of plating is finally perfected, say industry predicters, plated parts should then take at least 180 million pounds of phenol.
- Other outlets mentionable for increases of phenol resin binder are rock wool and fibrous glass insulation, and fibrous glass-filled molded pieces. Although difficult to appraise quantitatively, some estimates run in the neighborhood of 50 million pounds.

Elsewhere: Although phenol resins have accounted for the lion's share (60% to 75%) of phenol for some time, other uses are expected to expand within the next couple years.

The petroleum industry, for example, has been using increasing quantities of phenol as (1) a solvent for lubricating oil refining, (2) oil additives, and (3) emulsion-breaker chemicals.

Agricultural chemicals are also expected to swallow a large gulp of phenol. Herbicides, insecticides, fungicides, and germicides are expected to consume 75 million pounds a year or more.

The Summing Up: Totaling the cumulative effect of these developments leads to impressive conclusions. A score sheet of the outstanding new

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uses plus normal expectations from less spectacular uses might look like this:

End Use	Millions of pounds of Phenol
Phenolic resins	
Molding	135
Laminating	70
Adhesives	45
Wood waste binder	55
Fibrous glass	50
Shell molding	200
Metallic-coated	180
Miscellaneous	50
Chemical manufacture	75
Petroleum refining	45
Other uses	75
Total	980

Necessarily these quantities mark possible limits of different developments in various stages of progress. Most of the figures fall within a five-year span; one or two, such as shell molding, are based on admittedly optimistic reasoning by industry sources.

It would seem plausible that the phenol industry is about to enter another dynamic phase of advance. Having trod water, consumption-wise for the past four years, it appears to be on the verge of another spurt ahead.

LP-Gas Rises

Chemical use of LP (liquefied petroleum) gas parallels the general rise in consumption of this item. Latest figures show that total 1952 sales are 4,110 million gallons, an increase of 6.7% over 1951. Of this total, an estimated 886 million gallons were consumed in the manufacture of chemicals; this represents a 4.9% gain over the previous year.

Synthetic rubber manufacturers are the largest chemical takers of LP-gas. In 1952 they used about 400 million gallons—almost half the entire chemcal use.

LP-gas manufacturers point out that this rise in consumption was achieved in the face of unusual difficulties. In particular, they listed:

- The steel strike, which delayed the onstream dates of several large plants originally scheduled for summer or early fall.
- Shortage of LP-gas caused by increased use in crackers for production of ethylene.
- Methods of transporting the gases under refrigeration are not yet altogether satisfactory.

Of the three main components in LP-gas, suppliers predicted that chemical manufacturers would continue to favor ethane over propane or butane.

are these alkyl phosphites your blessed event?

DIALKYL and **TRIALKYL** PHOSPHITES are new arrivals in the chemical world... so new that their full possibilities have not yet been developed. Perhaps their birth may represent a "blessed event" in your particular field. It will pay you to examine the interesting properties of these new organic compounds.

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...As additives to lubricating oils, to serve as corrosion inhibitors, stabilizers, and antioxidants.

...In extreme pressure lubricants, to improve such factors as viscosity, film strength, load carrying capacity, penetrability, and to retard wearing, scuffing and seizing of bearing surfaces.

...As stabilizers, plasticizers, and antistatic agents.

All of the Alkyl Phosphites listed in the table below are available in commercial quantities. Samples and technical literature are yours for the asking. Simply request these on your company letterhead.

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DIALKYL HYDROGEN PHOSPHITES	Boiling Point	Specific Gravity	Flash Point, Cleveland Open Cup	Solubility in Water
DIMETHYL	72-3°C/25 mm	1.200	205°F	Soluble. Hydrolyzes.
DIETHYL	65-6°C/8 mm	1.079	195°F	Soluble. Hydrolyzes.
DIBUTYL	118-9°C/7 mm	0.995	250°F	Slightly soluble. Slowly hydrolyzes.
DI-2-ETHYLHEXYL	163-4°C/3 mm	0.937	330°F	Insoluble. Very slowly hydrolyzes.

All possess good thermal stability. Miscible with alcohol, ether, and most of the common organic solvents.

TRIALKYL PHOSPHITES				
TRIETHYL	65-6°C/24 mm	0.969	130°F	Slightly soluble. Hydrolyzes.
TRI-2-PROPYL	94-6°C/50 mm	0.914	165°F	Insoluble. Slowly hydrolyzes.
TRIBUTYL	118-21°C/7 mm	0.925	230°F	Insoluble. Slowly hydrolyzes.
TRIHEXYL	135-41°C/0-2 mm	0.897	320°F	Insoluble. Very slowly hydrolyzes.
TRI-ISO-OCTYL	161-4°C/0-3 mm	0.891	385°F	"
TRI-2-ETHYLHEXYL	183-4°C/0-3 mm	0.902	365°F	"

All possess good thermal stability. Miscible with alcohols, benzene, ether, heptane, carbon tetrachloride, and most of the common organic solvents.

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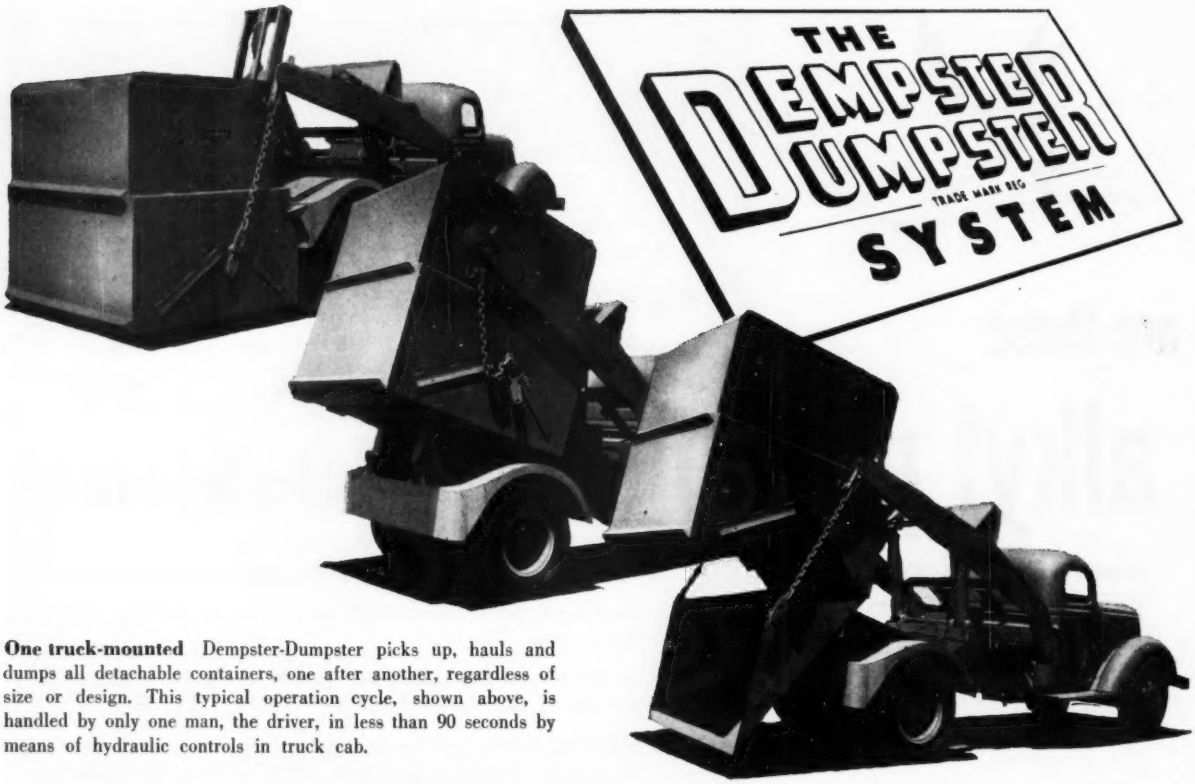
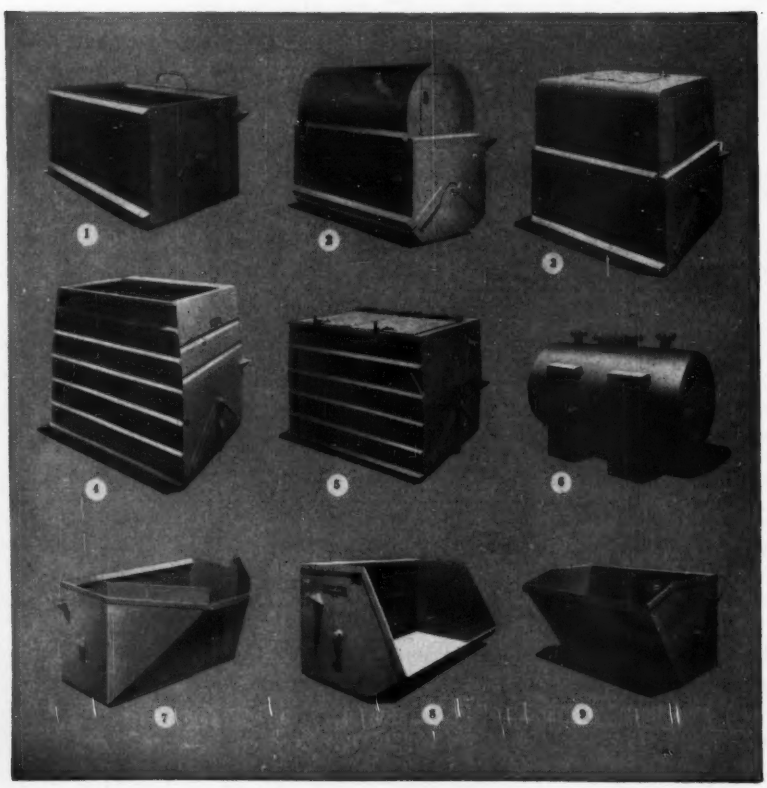


One truck-mounted Dempster-Dumpster picks up, hauls and dumps all detachable containers, one after another, regardless of size or design. This typical operation cycle, shown above, is handled by only one man, the driver, in less than 90 seconds by means of hydraulic controls in truck cab.



1—Cuts Cost of Equipment and Operation— It is not unusual for one Dempster-Dumpster to perform the work of from 3 to 5 conventional trucks . . . reducing investment accordingly. Eliminating trucks also means eliminating tires, gas, oil, maintenance and man hours.

3—Eliminates Re-Handling of Materials — Re-handling of materials, which by conventional methods are hand loaded by loading crews into dump trucks, is eliminated. Each detachable container remains at its convenient location until loaded. Then, in less than a minute, it is picked up by Dempster-Dumpster and taken to destination. There it is dumped or set down intact . . . saving hundreds of man hours annually.

• • •

At left are a few standard containers for general requirements—1—Drop Bottom Container built up to 10 cu. yd. capacity to handle heavy materials. 2—Apartment Type for bulk trash and rubbish with sump bottom for handling moist materials. 3—Universal Type available with top and end doors. 4—Drop Bottom Pressed Steel Type for lighter service. 5—Drop Bottom Pressed Steel Type with counterbalanced spring lids. 6—Tank Type Container meeting A.S.M.E. specifications. Capacities up to 1,200 gallons. 7—Tilt Type with Converged Lip for handling fine aggregate, wet or fluid materials. 8—Skip Type with Lip to assist in holding certain types of loaded materials in place. 9—Tilt Type for handling heavy materials. Built water-tight.

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The fundamental reason why the Dempster-Dumpster System is the most efficient method of materials handling by truck is because, in this system, one truck serves scores of detachable containers. In other words, a truck-mounted Dempster-Dumpster . . . with only one man, the driver . . . picks up, hauls, dumps or sets down intact . . . one after another . . . any required number of big Dempster-Dumpster Containers.

The hydraulically operated Dempster-Dumpster is mounted on any make truck chassis of suitable size.

The steel containers are available in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. They range in size up to more than three times the capacity of the average dump truck body. The containers are spotted inside and outside your plant at convenient materials accumulation points. A few of the dozens of detachable containers are shown here so that you may see the flexibility of this system in handling all types of materials in your plant with one truck. It may be that none of these containers will fit your own particular need. But remember there are Dempster-Dumpster Containers that will, either standard or special design.

More efficient and lower cost materials handling in your plant may be simply a matter of getting the probing minds of your engineers and ours together. Our files contain hundreds of inquiring letters that ultimately resulted in savings of thousands of dollars annually in every conceivable type of manufacturing plant. A discussion with our engineers might develop the same results for you. If advisable, they will be glad to make, without obligation on your part, a proper survey to determine just what equipment you may need. The Dempster-Dumpster System is manufactured exclusively by Dempster Brothers, Inc.

2—Eliminates Standing Idle Time— One man, the truck driver, replaces truck loading crew. Detachable containers are pre-loaded through normal accumulation. Truck-mounted Dempster-Dumpster and driver never stand idle because there is always a pre-loaded detachable container to be serviced.

4—Increases Efficiency, Sanitation and Good "Housekeeping"— The Demp-Dumpster System is a complete, unified plan for area-wide materials handling. Materials to be disposed of or transferred are placed in a nearby container as they accumulate. Containers used for trash and rubbish are fire-proof, rat-proof and fly-proof. No other method of materials handling by truck can match the Dempster-Dumpster System in efficiency and low operating cost!

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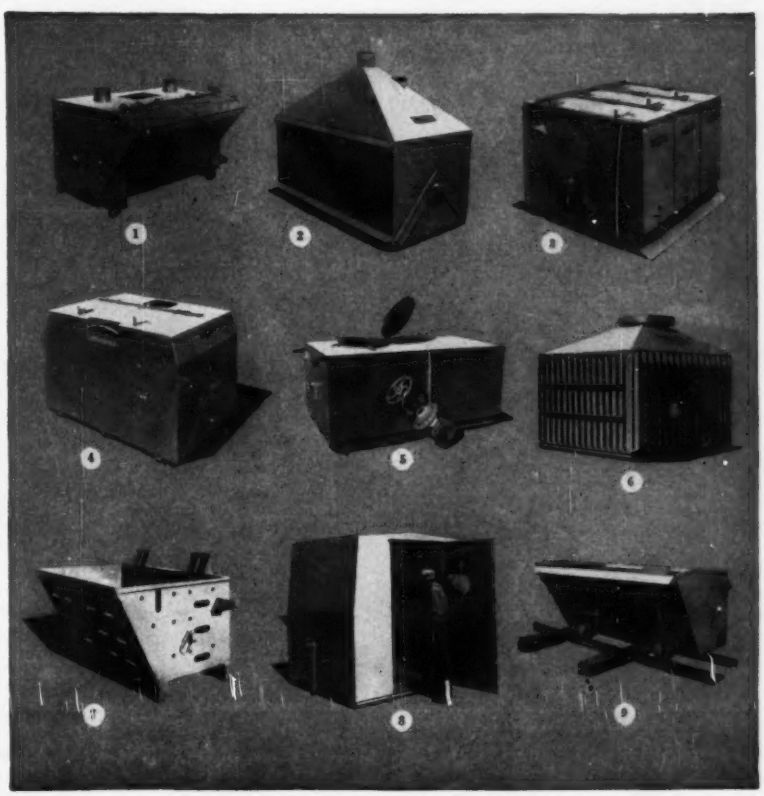
At right are a few containers built for special requirements— 1—Five cu. yd. container with swivel casters for handling waste blast sand. 2—Three cu. yd. Dust Collector Type equipped with gaskets. 3—Multi-Karry Container equipped with three 2 cu. yd. steel boxes with casters and lids. 4—Six cu. yd. drop bottom container with two spring-hinged lids and special loading opening in top. 5—Rectangular Tank Type Container with gate valve and gasketed Lid. 6—Chlorinator Ash Container designed for handling hot residue approximately 1500° F. 7—Tilt Type Container built for cast linings for handling hot materials. 8—One of several special "Tool and Equipment" Type Containers. 9—One of several types of special built containers equipped with ball bearing trucks.



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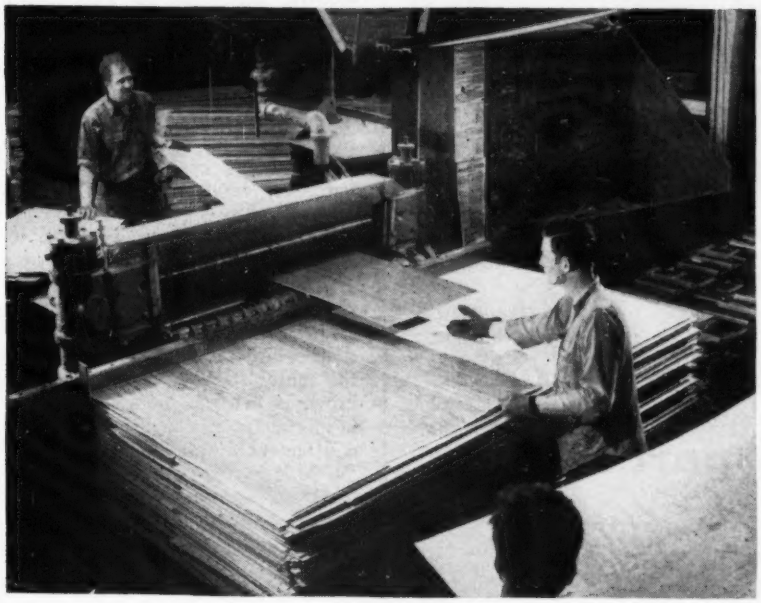

GLUE SPREADER: A thin coat, but it spreads out to $6.5 million.

For a Wooden Wedding

Demand for plywood adhesives—already used at an estimated 63 million pounds/year clip—booms as '53 brings new plywood plants onstream.

Phenolic, urea-formaldehyde and soybean glues are principal binders for the hard and softwood laminates.

Latest glue in major use: A mold- and bacteria-resistant protein-phenolic adhesive—and it's durable, cheap.

In full production now, capable of sopping up close to 150,000 pounds of glues per month is Medford Veneer & Plywood Corp.'s plywood plant at Medford, Ore. It, along with a number of other facilities, will likely boost this year's adhesive consumption to well over the 63 million pound pace of '52.

Major portion of the nearly $6.5 million worth of glues went into fir plywoods of the Northwest, but wood laminate makers of the South, Midwest and Northeast came in for a big share, too. Close to 3 billion sq. ft. of fir plywood—not including the hardwood plywoods—was turned out last year—wood of unique properties brought about by a trifling 10-15 pounds of resin (dry weight) per 1,000 sq. ft. of plywood.

Bloody Good: Latest glue to find favor with the Northwest fir plywooders (but still far from equaling in sales volume the major glues of urea-formaldehyde, phenol-formaldehyde, and soybean protein) is a blood-based phenolic. United States Plywood Corp., now selling it industry-wide calls it L-1R.

Animal protein glues, such as the L-1R, aren't spectacularly new. But in its new binder, U.S. Plywood appears to have whipped the problems of bacterial and fungal deterioration—and come up with a relatively inexpensive, highly moisture-resistant glue of low toxicity.

L-1R has proved to be of value in making interior plywoods. Mass home builders like Levitt (who has used plywoods extensively) find the laminate may be stored outside, unprotected, for months without damage.

Nevertheless, phenolic resin glues are probably the largest sellers to the plywood industry—one estimate places consumption in the vicinity of 23 million pounds per year. Urea-formaldehydes (most widely used in the South for hardwood plywoods), soya protein glues, and blood glues are each used at a 20 million pounds/year rate. Vegetable glues—dextrins, tapi-

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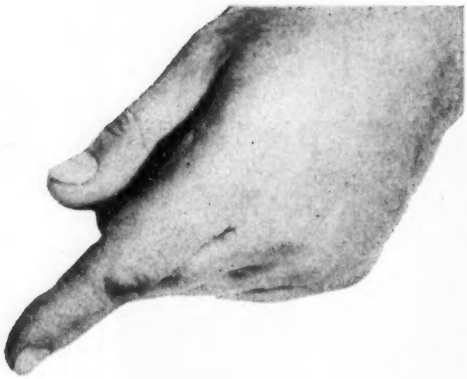

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McGRAW-HILL PUBLICATIONS

ocas—employed for low-grade packing-case plywoods are also heavily consumed, though figures are vague. But casein, the old standby, has definitely been eclipsed by the synthetic competition.

Inside, Outside: Precise formulation of the glues, the resin percentage, filler content, choice of catalyst or hardener, varies widely. It's largely determined by the end use of the plywood, and what specifications the laminate must meet.

Where the plywood must be waterproof and heat resistant,* the phenolics have had things pretty well glued down since they were introduced in the mid-thirties. They exude a dark brown or black glue line, though, and in special applications where this color is a factor, formulations of melamine (50-60%) and the rest urea-formaldehyde are used—though at a higher cost.

For the hardwood plywoods employed in furniture construction, for interior plywoods, urea-formaldehydes are most widely utilized. They're strong, durable, and at the current price of about 7¢ per pound, about half the cost of phenolics. The u-f's have their limitations, however: low heat resistance and lack of moisture strength.

Some of the leaders in supplying these adhesives are American-Marietta Co.; Balfour Guthrie & Co.; Borden Co.'s Chemical Div.; Monsanto Chemical Co.; Reichhold Chemicals, Inc.; and Rohm & Haas.

Multiple Modifications: There are a number of alterations in adhesive formulations to fit specific purposes. Perhaps the most important is addition of extenders. U-f's can be stretched amazingly by adding up to 200 parts extender (usually plain wheat or rye flour) to 100 parts resin.

Phenolics can be extended with bark flours, although not as much as u-f's. Nut shell flours—such as walnut—are also frequently used, principally to improve spreadability of the glue.

Likewise a variety of hardeners are employed. With u-f's, ammonium salts, such as ammonium chloride are the most common catalysts. These salts are frequently buffered with ammonia, which, in the hot plywood press, evaporates and permits the glue to set within three-four minutes.

The phenolics are usually cured with 0.1-1% sodium hydroxide. Phenolics can be acid hardened, although

* Illustrating this moisture resistance: The Douglas Fir Plywood Assn. phenolic-glued plywood tank for steeping test panel samples in boiling water. It is still firmly glued after several years.

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How the chemical process industries will likely fare with the new Congress, now in session . . . The significance of new rubber formulations involving rosin derivatives . . . How a large new plant will synthesize allethrin, the pyrethrum-like insecticide; pictures will tell much of the story . . . And the Markets section will interpret statistics, evaluate prospects of various insecticide materials . . . January weather means icy sidewalks and highways, but chemicals banish the dangerous ice; next week's issue will tell what chemicals are used, what the trend is . . . Selling antibiotics means dealing with the Food and Drug Administration; and that means problems. Look for a discussion of the problems, and various firms' solutions . . . Also, what about the Argentine as a market for chemicals—and as a competitive producer? Next week's issue will look southward.

CHEMICAL WEEK

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

in those cases there appears to be a weakening of the wood fibers, which has limited the acid curing use. Acid curing does have the advantage of producing a light glue line, however.

Both Sides Buttered: In making plywood, the adhesive is applied to only one surface: In a three-ply laminate, for example, only the middle layer (cross-banding, as it is termed) is coated, but it receives adhesive on both sides.

Grooved rollers—neoprene for exterior and some furniture plywoods, and sometimes steel for hardwood interior plywoods—smooth the adhesive on. These rollers have a surface speed of about 90 ft. per minute, and apply a very thin coat. An exception to the roller-applied glues is Rohm & Haas Tego No. 2. A German development, it is sold in the form of a rolled sheet, 0.005 inches thick.

From the coaters, the wood sandwich (top and bottom layers are slipped on immediately after the midsection is coated, *see cut*) moves to the presses. With phenolics, heat must be used to cure the glue; temperatures range from 230F to 300F. The pressures (the denser the wood, the more pressure required) range from 150 up to 250 pounds per sq. in. for the synthetic resins.

The big presses used for plywood have as many as 20 openings for making the wooden sandwiches—introduction of the synthetics, most of which require heat in addition to pressure, obsoleted many presses designed for casein glues. The caseins could be cold-pressed and cured in a few hours at room temperature.

Sticking with It: That's why a number of firms, largely those making plywoods for furniture use, have stuck by the caseins, although such binders are now more expensive than u-f's or phenolics. That, and the fact that they prefer to avoid the problems of learning new glueing techniques.

Among these techniques the maker of furniture plywood must learn are those relating to moisture content of the woods. With casein, little attention need be paid to the humidity in wood curing barns; with u-f's, wood with a moisture content of less than 5-6% (or more than 12-15%) will likely not laminate permanently.

Nevertheless, the advent of urea and phenolic glues opened the way for wide new plywood applications. Their freedom from fungal or bacterial damage made the plywoods again suitable for aircraft construction,* the

* Mold of the plywood used in the wing structure of a Fokker trimotor was blamed for the crash of the plane carrying Knute Rockne.

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Dryers, 2 Stainless Drums; 5'x10', First Machinery Corp., 157 Hudson St., N.Y. 13, N.Y.

Dryers—Rotary, 8'x54', dir. heat, roller, brngs. Consolid'd Prod., 18 Pk. Row, N.Y.C.

Filter Presses, 12" to 36". Loeb Equip. Supply Co., 1927-A North Ave., Chicago.

Filter Press, 42" x 42", Iron, Shriver, 18, 27, 36, 54 Chambers (12). Consolidated Products, 18 Park Row, N.Y. 38.

Filters, all sizes and types. Perry Equipment, 1415 N. 6th St., Phila. 22, Pa.

Filters, 24" x 24" Sperry 21-Bronze Chambers; No. 12—36" Sweetland 72-Brass Chambers. South Texas Machinery Co., Inc., 4300 Dixie Drive, Houston 21, Texas.

Labelers, All types, Rebuilt & Guaranteed. Process Industries, 305 Powell St., Brooklyn.

Mills, Traylor tube, 5'x22", 5'x20', 4'6"x18'6" 4'x13', stone lined, pebble charge (4). Consolidated Products, 18 Park Row, N.Y. 38, N.Y.

Mills, Day 14" x 30" 3 roll high speed roller (8) Consolidated Prod. Inc., 18 Park Row, N.Y. 38.

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Mixer — Day 1500 lbs — Center Discharge M.D. Jasper Machinery Co., 1123 B'way, NYC., CH-3-9010.

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Oliver Filter, 3' x 4' Phosphor bronze. Loeb Equip. Supply Co., 1927-A North Ave., Chicago.

Pebble Mills; 8'x8', Porcelain lined. First Machinery Corp., 157 Hudson St., N.Y. 13, N.Y.

Pebble Mills 10 gal. to 800 gal., porcelain lined 20. Consolidated Products, 18 Park Row, N.Y. 38.

Polyethylene Drum Liners, 37" x 62" x 2 mils, 10t of 5000 @ $250.00 M, lot of 9500 @ $210.00 M, frt. allowed anywhere in U.S.A. except West Coast. Sample on request. Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

Reactors, Pfaudler Jktd. 400 Ga. First Machinery Corp., N.Y. 13, N.Y.

Rubber Mill, 12" x 24" Birmingham. Loeb Equip. Supply Co., 1927-A North Ave., Chicago.

Tanks, 6 New 20,000 Gal. 5/16" thick, In N.J. & Mo. Lestan Corp., Rosemont, Penna.

Tanks, Alum, closed — 330, 480 and 1450 gal. Perry Equipment. 1415 N. 6th St., Phila. 22, Pa.

Tanks, Steel, Processing, 15,000 gal. vertical, 80 lbs. int. pr.; Turbo agitator 40 HP, coils. Perry Equipment, 1415 N. 6th St., Phila. 22, Pa.

Tanks, S/S, from 30 gal. to 5700 Gal. Perry Equipment Corp., 1415 N. 6th St., Phila. 22, Pa.

Vacuum Pan, Mojonnier 26". Loeb Equip. Supply Co., 1927-A North Ave., Chicago.

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phenolics permitted plywood use in boats (like the famous P-T torpedo boats) and marine structures.

Wet or Dry: The major plywood producers buy adhesives in liquid form, in tankcar lots, rather than in dried form. The liquid glues, easily stored in tanks, can be readily used. The catalysts, ordinarily sold dry, generally move in large drums to the big users.

And the number of big users has multiplied in recent years. Back in the mid-twenties, there were only a dozen or so makers of the fir plywoods; by this year there will be 70. Behind much of this boom are the improvements in adhesives: Casein-blood-silicates types met the aircraft needs of the first world war; it was a leading glue until Harbor Plywood introduced its phenolics in 1934. Phenolics meant exterior plywoods—and the number of mills jumped; by '38 there were more than 20 mills. Urea glues came in about 1937, and also spurred growth.

But research is far from halted. Specialized plywoods, metal faced, have required casein-latex formulations, and have opened the way for epoxy glues. Resorcinol glues show possibilities in marine structure bonding, but their high cost, and tendency to stain through thin veneers have limited their plywood application, though development is being continued.

Among the problems now facing the adhesives specialist is finding a dependable, completely waterproof glue that can be set at room temperature in a cold press. Or more immediately, a phenolic that would set at 200F or below—a glue that would do much to eliminate the "checking" of veneers that takes place in present plywoods as they weather. They're pretty tough problems for the chemist, problems in how to wed wood to wood.

Paint Plant Changes

The paint business seems to be booming for some, but slowing down for others. Sales of National Lead Co.'s Lorite, a diatomaceous material used as an extender for pigment in latex emulsion paints, have proved so sprightly that the firm will increase production facilities. A new plant for

Dedication, Mexican Style

BANDS, BANQUETS and ceremony mark the dedication of the Stauffer de Mexico, S.A., insecticide plant in Nogales, Sonora, Mexico. The Governor of Sonora and a host of other dignitaries provided the proper south-of-the-border flourish to open the plant officially. Designed for mixing insecticides from American raw materials, the new facilities are a major industrial addition to the Mexican West Coast, besides fulfilling a strong need of Mexican agriculturists. It's Stauffer de Mexico's first plant.

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St. Louis 8 ..... 3615 Olive St., Continental Bldg., Lucas 4867

SPECIALTIES . . . . .

Lorite in Edson, Kansas, is due on stream in April, will double the present capacity.

• There's an upcoming boost for paint makers, too. That's Clean Up-Paint Up week, scheduled for late March, timed to tie in with spring cleaning.

• Even without help from Paint Up week, things look bright for Worth Chemical & Paint Co. (Lake Worth, Fla.). It has a new plant under construction for manufacture of its paints and varnishes, detergents and other specialty products.

• On the other hand, Eagle-Picher Co. (Cincinnati) is pulling out of the home paint field, it appears. In accordance with its plans to concentrate on supplying raw materials to other manufacturers, it has closed down its paint and varnish facilities in Atlanta, Ga., as well as those in Oklahoma City, Okla., and Lyons, Ill.

• But they can't all be success stories: Mason Paint Co. (Louisville, Ky.) has sold its recently constructed, 35,000 sq. ft. plant to the Salvation Army, for $300,000.

•

Plastic Ink: A series of new inks, available in transparent and opaque colors, and claimed to possess high adherancy to plastic has been developed by Artone Color Corp. (New York). Both removable (35¢/oz) and permanent (65¢/oz) types are offered.

•

Production Up: Boosting production 250 percent, Carbide and Carbon Chemicals Corp. seeks to eliminate any chances of a shortage of its Crag Fruit fungicide 341 in the 1953 season. In short supply during 1951 and 1952, it is a glyoxalidine fungicide (2-heptadecyl glyoxalidine acetate) developed via Carbide's fellowship at Boyce Thompson Institute. It is sold to control apple scab and cherry leaf spot and to prevent red mites from multiplying.

•

Diazo Maker: Azoplate Corp. (Summit, N. J.) has taken over the chemical manufacturing facilities of Keuffel & Esser Co., and is now selling the diazo chemicals made by that firm.

•

New Soaks: The cellulose sponge business appears to be doing all right. O-Cel-O, Inc., recently merged with General Mills, Inc., plans to squeeze out a cool $1 million for machinery and possible plan expansion in 1953. With present facilities, the organization can't expect to catch up on back orders for a full year. O-Cel-O is working out new variations and uses for its products.

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Acetamide		●	●										●			●					
Acid Fluoboric	●	●		●			●	●	●	●	●	●			●						
Acid Hydrofluoric, Reagent		●		●			●			●	●										
Alkali Fluoborates							●	●		●	●										
Aluminum Chloride, Solution		●	●			●	●		●	●	●	●	●	●		●	●	●	●	●	
Aluminum Fluoride, Crystal		●								●		●		●							
Aluminum Nitrate		●		●								●							●		
Ammonium Acetate						●				●		●		●			●		●		
Ammonium Oxalate			●		●				●	●			●	●		●	●		●		
Ammonium Sulfate Purified and Reagent A.C.S.	●	●				●	●		●	●				●		●	●			●	
Ammonium Thiosulfate				●					●	●				●	●					●	
Boron Trifluoride Gas and Various Complexes		●								●	●	●	●	●		●		●		●	
Cadmium Nitrate	●	●		●			●					●	●			●					
Calcium Acetate Purified and Reagent		●				●							●	●		●		●	●		
Calcium Chloride, Anhydrous Purified and Reagent A.C.S.				●		●										●					
Calcium Phosphide					●						●										
Chlorine Trifluoride		●														●					
Chromium Fluoride		●	●							●			●							●	
Chromium Nitrate		●														●					
Chromium Potassium Sulfate (Chrome Alum)		●	●						●					●	●		●			●	
Cupric Nitrate		●	●		●			●		●					●					●	
Cuprous Chloride	●	●	●		●						●	●	●	●		●				●	
Ferric Nitrate			●						●											●	
Ferrous Ammonium Sulfate		●	●							●								●			
Lead Nitrate		●	●		●				●		●	●	●	●	●		●		●	●	
Metal Fluoborates										●						●					
Oxamide					●																
Potassium Acetate		●		●					●	●				●		●	●			●	
Potassium Bifluoride		●		●			●			●										●	
Potassium Borate, Tetra										●											
Potassium Fluoride		●								●											
Potassium Nitrite		●	●			●				●		●						●	●		
Potassium Permanganate																					●
Potassium Titanium Fluoride											●							●			
Sodium Bisulfite, Meta Purified and Reagent						●									●					●	
Sodium Fluoride, Reagent A.C.S.								●						●							
Stannous Chloride		●	●					●	●	●				●					●	●	
Sulfur Hexafluoride				●																	

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